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Great deeds are done and great discoveries made."

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"It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us. These laws, taken in the largest sense, being Growth with Reproduction; Inheritance which is almost implied by reproduction; Variability from the indirect and direct action of the conditions of life, and from use and disuse; a Ratio of Increase so high as to lead to a Struggle for Life, and as a consequence to Natural Selection, entailing Divergence of Character and the Extinction of less-improved forms. Thus, from the war of Nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is a grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved."—DARWIN.

YRABU
 ROBU. GORHATS
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THE ENTOMOLOGIST.

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VALEDICTORY.

WITH the present number the 'ENTOMOLOGIST' changes its proprietorship, a change which has only been made once previously during half a century, and was then from father to son. Founded by the late EDWARD NEWMAN in 1840, it was continued for two years, and then became the 'ZOOLOGIST,' a magazine which was to include, as it does to this day, diverse branches of Natural History.

By the year 1864, however, the entomological communications had so increased as to demand a separate publication, and the 'ENTOMOLOGIST' was re-created to receive them. My late father again edited the journal, and continued to do so until his death in 1876.

After his death, Mr. CARRINGTON became Editor, assisted in his duties by Messrs. BOND, FITCH, FREDERICK SMITH and JENNER WEIR, Dr. POWER and Dr. BUCHANAN WHITE; and on the deaths of Mr. Smith and Dr. Power, Messrs. SOUTH and BILLUPS consented to join the staff. For their generous and long-continued service, my hearty thanks are due to all these gentlemen, as well as to our many contributors; our relations have always been most pleasant and cordial.

It is not without much regret that I have consented to forego a proprietorship which has become almost a family tradition, and to break this long-established connection of editors and proprietor. But it is the official bond only which is severed; the friendship remains unimpaired.

Under the proprietorship of my successor, Mr. J. H. LERCH, the 'ENTOMOLOGIST' will, I am convinced, become increasingly valuable; and for him and his Editor, Mr. SOUTH, who is already well known to them, I would ask the continued support of all our readers.

T. P. NEWMAN.

It is with feelings not unmingled with regret that, by force of circumstances, I retire from the position of Editor of the 'Entomologist.' It is, however, very gratifying to me to remember that during the period—now more than thirteen years—I have edited this magazine, I have received such uniform support from its contributors and readers. To them I tender my hearty thanks. It is a further satisfaction to feel that, in all those long years, no word I have placed in its pages has lost to me a single friend; but my association with the 'Entomologist' has introduced me to many whose friendship is greatly valued.

To those whose names have appeared on the title-page, in connection with mine, I also tender my thanks,—to each in measure as they have individually responded to my appeals for assistance.

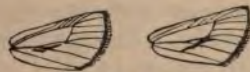
Lastly, I must thank Mr. T. P. Newman for his support, without which it would have been impossible to have gained for the 'Entomologist' such success as it has attained.

JOHN T. CARRINGTON.

HESPERIA LINEOLA, OCHSENHEIMER: AN ADDITION TO
THE LIST OF BRITISH BUTTERFLIES.

By F. W. HAWES.

THE specimens,—three in number, all males,—from which the accompanying description is made, were taken by me during the month of July, 1888, in one of the eastern counties, and remained until quite recently in my cabinet, merely as curious varieties of *Hesperia thaumas*. Happening, however, one day last month, to turn over those plates in Dr. Lang's 'Butterflies of Europe,' on which the genus *Hesperia* is figured, I was struck with the great resemblance of my specimens to a species represented at Plate 81, fig. 10. A reference to the description at p. 351 of that work suggested the probability of the so-called varieties being in reality *H. lineola*, the three main points of distinction between *H. lineola* and *H. thaumas* appearing in strongly marked contrast when the specimens under consideration were compared with undoubtedly fresh examples of *H. thaumas*. In the course of the week following my supposed discovery Mr. Carrington spent an evening with me looking over my collection of Diurni. To him I communicated my beliefs, at the same time showing him the specimens, and he confirmed my opinion that I had, indeed, British examples of *H. lineola*. Since then we made a visit to the Doubleday collection at the Bethnal Green Museum, when, whatever doubts I may have had, were at once dispelled, my specimens being exactly similar to the five males contained in the Doubleday European collection, although two of my three are larger, and one is distinctly finer than the examples labelled "*lineola*, France," in that collection.



1. *H. lineola*. 2. *H. thaumas*.

I believe *H. lineola* has been overlooked owing to its great similarity to *H. thaumas* in appearance, and the fact that it flies at about the same time of year (or possibly a week later) in the same localities as the commoner insect. If all collections in this country, consisting avowedly of British insects, were carefully examined, I have little doubt that native *H. lineola* would be found hidden away in some unexpected corners. At any rate, an examination of localities known to produce *H. thaumas* may result, during the coming season, in the capture of this butterfly in widely different parts of the British Isles. The known range in Europe extends, according to Dr. Lang's work, from Scandinavia in the north to North Africa in the south.

To proceed to a comparison between *Hesperia thaumas* and *H. lineola* for the purposes of distinction, it will be noticed, from the figures given of one anterior wing of each of the male butterflies, that the black bar on the fore wings in *H. thaumas* is decided, continued, and bent slightly downwards at about the centre. In *H. lineola* the bar is narrow, broken, and has no curve, is frequently very indistinct, and always considerably shorter than in *H. thaumas*. Again, in *H. thaumas* the bar springs from a point at about one-third of the length of the inner margin, reckoning from the thorax; in *H. lineola* the bar appears almost to run into the base of the wing at its juncture with the thorax. These are characteristics of the male insects only, and the remaining points of difference apply equally to both sexes. Perhaps the most positive and unfailing distinction in both male and female *H. lineola* is to be found in the coloration on the under side of the antennæ. In *H. thaumas* this tint is of a faint buff, never dark; whereas in *H. lineola* the under side of the tips is of a decided black. A third point of difference is the absence, in *H. lineola*, of the fulvous patch on the inner margin of the under side of the hind wings, the insect in this respect bearing a considerable likeness to *H. actæon*. These three, then, are what may be called the distinguishing features of *H. lineola*, when compared with *H. thaumas*; but there are other minor and less perceptible differences, i. e., *H. lineola* has a duller and more suffused appearance, especially at the hind margins, more decided neuration of the hind wings, and on the under side a greenish hue; whereas *H. thaumas* has a rich glistening colour, is usually clear at the hind margin, and has a grey appearance on the under side. The two species approach each other very closely in size; perhaps *H. thaumas* is a trifle more elongate (see fig.) than *H. lineola*.

I venture no opinion now as to the right of *H. lineola* to be considered a distinct species. The position of *H. lineola* in our collections is between *H. thaumas* and *H. actæon*.

I may say here, however, that I hope I may be able in course of time to supply a life-history of this new addition to our Rhopalocera in all stages from British parents.

Since writing the foregoing I find that Mr. J. T. Carrington captured in 1889, also in the same county in which I took my specimens, several examples of *H. lineola*, including females. They were taken at some considerable distance from the first-named locality, but about the same time of year, although one season later.

NOTES ON *AGROTIS ASHWORTHII*.

BY WILLOUGHBY GARDNER.

Of the many interesting species of Agrotidæ inhabiting the British Islands, none have had a greater fascination for the writer for many years past than *Agrotis ashworthii*.

Who, indeed, that has seen the delicate dove-colour upon the wings of this insect, when freshly emerged from the pupa, can help being perpetually captivated by its quiet and unassuming beauty?

Beyond the attractiveness of the imago itself as a beautiful object in Nature, the history of the species, its habitat, and a certain justifiable pride in an insect peculiar to one's own home district, have tended to keep up a perennial interest in *ashworthii*.

Running in a northerly direction from Llanymynach, in Shropshire, through Denbighshire and Flintshire to the sea, and thence, with a slight break, due west along the coast as far as the Great Orme's Head, is a narrow strip of what is known to geologists as carboniferous limestone. This strip of limestone rests unconformably upon a series of hard slaty Silurian rocks, which crop out from below it to the west and south of its course, while to the east and north it dips more or less suddenly beneath newer beds of coal or sandstone or the sea. At intervals between these two extreme points the ridge forms magnificent and picturesque escarpments, often rising to cliffs several hundred feet in height: these are seen at Llanymynach itself, at Llangollen, near Mold, at Llandulas, and at other points.

It is a curious and most noteworthy fact, that wherever the carboniferous limestone crops up upon the surface of the earth in this country, there a perfect treasure-hoard of objects of interest, for the student of nearly every branch of science, is accumulated, such as is to be found on no other geological formation.

The entomologist finds upon these long limestone escarpments many rare and interesting insects. Among these may be noted particularly *Procris geryon*, *Mamestra furva*, *M. abjecta*, *Agrotis pyrophila*, *A. lucernea*, and, foremost and most attractive of all, *Agrotis ashworthii*. Upon this notable, and in so many ways famous, ridge of rock, this species has its home; here it was first discovered, here it still thrives and multiplies, and beyond it rarely seems to stray.

This beautiful and scarce insect was first discovered by the late Mr. Joseph Ashworth, an ardent entomologist, who resided for some time at Bron Hyfryd, near Llangollen: this house is close by the finest cliffs along the whole range of the above-mentioned limestone rocks, which are known here by the name

of the Eglwsegs. Along these rocks Mr. Ashworth collected with much industry and perseverance, securing many scarce species; chief among these was the *Agrotis* which bears his name. With Mr. Ashworth's death, however, the exact whereabouts of the habitat of *ashworthii* appears to have been lost for some time, till it was re-discovered, somewhere about twenty-five years ago, by the late Mr. Nicholas Cooke. This eminent and indefatigable entomologist started one day at 6 A.M., upon a rocky crag at one of the traditional spots, and worked straight ahead for full twelve hours without a break, till success crowned his efforts. From that time to the present the study of *A. ashworthii* in its natural haunts, amid some of the most charming bits of rock scenery in Wales, has afforded delight and pleasure to many a friend of the re-discoverer of the species.

The imago of this *Agrotis* usually makes its appearance about the beginning of July, though it is very much later in certain seasons, being found occasionally freshly emerged during the early days of August.

Pairing soon takes place, and the eggs are generally deposited upon the wild thyme, the favourite food-plant of the insect; these, pale white and very conspicuous at first, soon grow darker in colour, and hatch out in warm seasons at the end of about twelve days. The little larvæ are very active from the day of their birth, "looping" along just like a Geometer. They appear to be somewhat delicate in their earlier stages, and do not take kindly to any food, even their native wild thyme. They feed only at night, and by day hide themselves most effectually among the herbage and loose clods of earth; as autumn approaches they stow themselves away in snug corners for the long winter sleep, having now attained to fully half their size. Hybernation lasts no longer than the first warm sunny days of spring, when the larvæ come forth again with appetites whetted by the long fast. Now they seem to be much less particular in their diet, for they will feed greedily upon very many of the plants they find around them: among these food-plants may be mentioned, in addition to wild thyme, golden-rod, sun cistus, fescue grass, and various hawk-weeds. I have never noticed that sallow was touched by them in a state of nature, but in confinement they will greedily devour both the leaves and catkins. The larvæ are generally full fed about the middle of May, but the time varies by a fortnight earlier or later, according to the season. They then bury themselves in the ground, turn to pupæ, and in due course produce the perfect imago.

Though sombre in tone, like the perfect insect, the larva of *ashworthii* is eminently striking in appearance; its body is smooth and cylindrical, of a smoky green colour, carrying upon the back of each segment a large oblong mark of most intense

velvety black; a bright red shining head and red-brown prolegs stand out in strong contrast, giving the caterpillar a decidedly *distingué* aspect, which at once marks it out from the common herd of Noctuæ.

The indescribably beautiful dove-colour of the fore wings of the perfect insect has already been alluded to. As in so many other living things, this ebbs away sadly with the life of the insect. Across the wings run three wavy dark lines; between the second and third is a rich brown shade, very much enlarged in the female, almost absent in the male; within this patch of colour the orbicular and reniform are more or less conspicuous, according to the intensity of the shade; the hind wings are smoky grey; and the head, thorax, and body pale blue grey, like the fore wings. Though simple and quiet in colouring, the imago of *Agrotis ashworthii*, like its larva, is at once beautiful and striking, and cannot possibly be mistaken for any other British species.

Now in writing thus of the life-history of *A. ashworthii*, the question naturally suggests itself, How comes it that this particular Noctua is confined to so limited a habitat, and is, so far, unknown to exist elsewhere?

The Entomological fauna of the greater part of Europe has now been pretty thoroughly investigated, and much collecting has been done in various other parts of the world, yet *A. ashworthii* has never yet been discovered in any other locality. Why is it that the insect has never strayed from its native Welsh mountains, while most species of these temperate climes have so wide a range of habitat? How long has it existed and flourished there, and where did it originally come from, leaving apparently no trace of its kindred behind it? Who can tell?

Its food-plant is no rare and local herb; the wild thyme, rock cistus, and other plants upon which it thrives, are common in many other places. The geological formation which it prefers is a limestone found in many parts of Great Britain, as well as on the Continent of Europe and elsewhere. Its habitat is neither alpine, insular, nor peculiar as to climate or otherwise; and yet our insect seems debarred, in some mysterious and extraordinary way, from straying abroad from its own particular adopted home. It cannot, of course, have existed there always, but must have travelled westwards with one of the great waves of life which invaded these islands from the Continent some time after the close of the last glacial epoch. Still, impelled by some curious impulse, it has journeyed straight to its present mountain home, leaving no colonies in similar situations behind it in its course, nor, apparently, any survivors in the original cradle of its race.

The species of *Agrotis* which it most resembles is the continental *A. candelarum* (Staud.). This somewhat rare insect has a

range across Central Europe, from the Ural Mountains, through Poland, Germany, and Switzerland, as far as the western provinces of France. The imago is not unlike that of *A. ashworthii*, but the fore wings are of a more *ashy* grey, varied with red; the larva, though different in colour from that of *ashworthii*, resembles the latter in having a series of deep black marks along its back, which are, however, arrow-head-shaped instead of square. It feeds upon various low plants, such as golden-rod and dock, the first-named of which is included in the pabulum of *ashworthii*. It is possible, therefore, that the immediate ancestor of *A. ashworthii* may have been the European *A. candelarum*, though ours is now quite a distinct species from the continental insect. Neither the larva nor the imago of *ashworthii*, as found in its Welsh mountain home, now shows the slightest inclination to "cast back" to an earlier type such as *candelarum*; and indeed, in the course of a long experience of the insect, the writer has been struck by the *very slight* tendency to variation exhibited by our species.

Unlike many rare animals and plants which have found a last resting-place in some out-of-the-way corner of the globe, there to dwindle away till they become extinct from natural causes, *Agrotis ashworthii* seems to thrive and multiply in its native haunts. Long may our unique and interesting local *Noctua* continue to do so!

Liverpool, November 10, 1889.

AN ENTOMOLOGICAL TOUR ON THE TABLE-LAND OF MOUNT ARTHUR.

By G. V. HUDSON, F.E.S.

DURING the summer of 1888—9 I spent a week on the table-land of Mount Arthur for the purpose of investigating the insect fauna of the locality, and, as it presents some marked and interesting peculiarities, perhaps it may be desirable to place my observations on record, and also, for the benefit of future naturalists, to give a few practical hints as to the best way of reaching the locality, and what to do when there.

Mount Arthur is the highest peak on the western side of Blind Bay, and is always a conspicuous object from the town of Nelson. The table-land is situated behind the mountain range,—that is, on the north-western side of it,—and extends for about ten miles in the same direction, till we reach Mount Peel. Its width is not so great, being, I should say, from five to eight miles; but, owing to the broken nature of the country, it is evidently hard to say, especially as there is so much high land

all round. This plateau varies from 3600 to 4000 ft. above the sea-level, and is covered with mountain birch, traversed by many singular openings, which support a dense growth of tussock-grass and numerous alpine plants. The mountains easily accessible are Gordon's Pyramid (4600 ft.), Mount Arthur (5800 ft.), and Mount Peel (5500 ft.). The varying elevations which are traversed in ascending these gives the naturalist a rare opportunity of observing and collecting an extremely interesting series of alpine plants and insects. Respecting the former I can give no information, but feel sure that a visit to the table-land would amply repay any botanist who was not afraid of a little hard work. As to the best means of reaching the table-land, it of course depends entirely upon whether we make Nelson or Motueka the base of operations: in either case a horse and trap is required, but while a whole day's driving is necessary from Nelson, less than half the time is needed from Motueka to reach the Graham's River. This is a small branch of the Motueka River, which rises in the Mount Arthur range, and flows into the main stream about fifteen miles above the town. After crossing the Motueka a short distance above the mouth of the Graham a fairly good road takes us to Heath's, where it is usually convenient to stop the night before continuing the journey. Arrangements can also be made with Mr. Heath to carry the bulk of one's impedimenta by pack-horse on to the table-land, which is a great assistance, especially as it is necessary to take provisions for the whole time one intends to remain there, and an abundance of clothing to put on during the cold nights.

As soon as the usual hideous stratum of burnt logs, which surrounds almost all cultivation in New Zealand, is passed, the forest becomes extremely beautiful, and the views which one obtains from the back, as it passes up the side of the Graham River, are really very fine. About four hours' hard climbing from Heath's brings us to the saddle at an altitude of about 3000 ft. above the sea-level: here the source of the River Pearse is crossed, where several interesting Neuroptera can be captured, a delicate species allied to *Hemerobius* being one of the most conspicuous. Just before we cross this stream a fine view of Mount Arthur is to be seen through an opening in the trees. From this point the track gradually descends, following the sea of Flora Creek for a matter of ten miles, and passing through dense birch forest all the way. Here on favourable days in January and February may be seen the rare and beautiful *Dodonidia helmsii* flying quietly about in and out of the sunshine, and settling on the branches just out of reach. I may state that four specimens of this butterfly only have at present been taken, and that the British Museum are much in want of a type; so perhaps visitors to this locality may be good enough to look out for the insect, and obtain one for the National Collection. I

think it will be found on most of the wooded hills in the Nelson Province between 2500 and 3000 ft., as I took a poor specimen on the Dun Mountain (1885) in quite a different neighbourhood. It is also said to have occurred on the hills on the other side of Wellington Harbour, but I have not seen it.

About two miles after we leave the source of the Pearse a small clearing is reached, called Flora Camp, which is a convenient halting-ground for those who wish to ascend Mount Arthur without visiting the table-land, as a branch track can be followed up shortly after we leave the saddle leading directly on to the mountain.

The track along Flora Creek in many places presents a most picturesque appearance, the numerous waterfalls and the gradual increase in the size of the stream being features of especial interest. To an entomologist with a tent and plenty of time no doubt a day would be well spent here collecting Neuroptera over the stream, Micro-Lepidoptera, and sugaring the trees at night for moths.

About three miles before we reach the first opening on the table-land the track leaves the bed of Flora Creek, and starts to ascend very rapidly, following the course of a small stream which rises in Salisbury's Opening, near the first hut that is reached. This hut, however, is now quite unfit to stop in, but there are several others in various parts of the table-land that can be used, and are far warmer than a tent, which is not a sufficient protection against the cold at so great an elevation above the sea-level.

Acting on Mr. Meyrick's suggestion, I took a kerosene-lamp with me to the table-land, and lit up at dusk on the first evening (Jan. 22nd). The night was slightly overcast, with a few drops of rain, and much warmer than usual, the result being that several good moths were captured at the lamp, including three specimens of *Leucania propria*, several *Mamestra rubescens*, and a rare *Bombyx*, besides several *Scoparia trivirgata*.

The next day (Jan. 23rd) I decided to ascend Mount Arthur, and left the hut at 7.30, the weather being everything that could be desired. A few minutes' walk brought us to the foot of Gordon's Pyramid, where the track was soon discovered, and followed up until the bush-line is passed at about 4000 ft. I had better, perhaps, mention that this portion of the forest is very rough, and it is most necessary to exercise great care in keeping to the track, which, however, is now well-marked by numerous blazes made during two successive visits. After leaving the forest the vegetation is very rank, consisting of a great variety of alpine plants, tussock, &c. Here, in the hot sunshine, occurred *Harmologa sirea* in great numbers, in the finest condition, flying with much agility, besides large numbers of

Notoreas paradelpha, *Harmologa latomana*, and *Tauroscopa gorgopis*. Two specimens of *Erebia pluto* were taken on a patch of shingle at about 4200 ft., but this must be regarded as an exceptionally low elevation for the species.

On arriving at the top of the Pyramid a long descent is made to reach the Mount Arthur range proper, and it is here that probably the best collecting on the table-land is to be found. *Metacrias erichrysa* was frequently seen dancing about in the hot sunshine, and extremely difficult to catch. Two other Bombyces were also obtained, which are not yet identified; but any moths belonging to the group are of extreme interest, owing to the singular absence of its members from the fauna of the lowlands in New Zealand. High up, at about 4800 ft., *Stathmonyma anceps* was found, the dark grey fore wings harmonising admirably with the rocks on which it perches, besides specimens of *Orocrambus mylites* and *catacaustus*. These insects occurred up to the extreme top of the mountain, as well as *Erebia plecto*, which was very abundant on the shingle-flats above 5000 ft. I must confess that the ascent of the last 800 ft. of the mountain considerably alarmed me, although no doubt the dangers are nothing in the eyes of more experienced climbers.

On the top we discovered the names of previous visitors during the half-hour spent there, and noticed numerous specimens of *Erebia pluto* and *E. orocrambus*, so I am disposed to think that their range of elevation would be considerably more extended on a higher mountain; but, of course, this is a matter for future observation. Above 5000 ft. the only common plant is a fine wiry grass, which I conjecture is the food-plant of these insects. The discovery of the larva of *Erebia pluto* would be of excessive interest, and the insect might probably be reared by anyone who was able to spend two or three months on the table-land, as I think the females would readily lay their eggs in captivity if the young larvæ could not be found. An accurate record of the times of appearance of these alpine insects would also be extremely valuable, which, of course, could only be obtained by a naturalist residing on the table-land during the whole summer.

During the descent numerous stoppages were made to obtain insects, *Erebia pluto* continuing extremely abundant until we left the shingle and snow. Lower down a few Coleoptera were obtained by beating spear-grass blossoms, but the Lepidoptera absorbed most of our attention. It was curious to make the acquaintance here of *Dasyuris partheniata*, a species found on the cliffs above the Hermit's Cave, Wellington, but nowhere, as far as I know, on the sea-level in the Nelson Province. When the top of Gordon's Pyramid was again reached at six o'clock, I was startled to see a conspicuous black insect flying about, which

I felt sure was not *Erebia pluto*. On capturing it I at first took it to be *Erebia butleri*, but subsequent examination proved that it was not a butterfly at all, but *Stathmonyma hectoris*. A rapid descent soon took us through the forest, which appeared extremely beautiful in the evening sunshine, and terminated one of the pleasantest days I have ever spent.*

(To be continued.)

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.

By J. W. TUTT, F.E.S.

(Continued from vol. xxii., p. 305.)

Apamea, Och., *ophiogramma*, Esp.

The type of this species is represented by Esper's plate 182, fig. 2, 'Die Schmetterlinge,' &c., and may be described as having "The anterior wings yellowish ochreous, with a large, dark-red, somewhat triangular-shaped, costal patch, enclosing the yellowish reniform, and then extending narrowly along the costa to the base; the orbicular obsolete; below this and forming an outline to its lower edge is a yellowish, followed by a slaty, line extending from centre of base to anal angle; below this line the colour is yellow-ochreous, as is also the outer margin to apex; several dark marks on outer margin. Hind wings grey, with greenish tinge." Hübner's figure 355 is "a pale grey-brown ground colour, with a large black costal patch extending from the base, so as to include the dark stigmata; this patch is outlined in whitish; a pale line parallel to hind margin, a dark patch in the middle of the hind margin, and dark forked (>) mark at the anal angle. Hind wings dark grey, with lunule." Haworth describes the species under the name of *biloba* ('Insecta Britannica,' p. 209). His description is:—"Alis griseis fascia abbreviata marginis crassioris subdolabriformi nigra, in qua stigma reniforme griseum."

Apamea, Och., *leucostigma*, Hb.

Hübner twice figured this species,—first under the name of *leucostigma* (fig. 375), and then a very marked variegated variety, of a bright red colour, under the name of *fibrosa* (fig. 385). The latter name has been in general use in Britain for this species. Our specimens are very variable, but all are of a dark umber-brown ground colour. There are two very distinct forms occurring in Britain,—one, variegated with paler transverse basal lines, and a broad pale band extending from the apex to the inner margin, just beyond the anal angle, and extending along the inner

from a paper read before the Wellington Philosophical Society, July

margin; the median nervures whitish and branching under the reniform, and with either white or ochreous reniform stigmata, = var. *intermedia*;—the other more unicolorous, with the transverse markings comparatively obsolete, the reniform either white (= var. *albipuncta*) or ochreous (= the type). We get nothing in Britain so extreme as Hübner's *fibrosa*; and Guenée, in the 'Noctuelles,' vol. v., p. 210, makes the same remark about the French specimens. He also adds that "specimens are found intermediate between *fibrosa*, Hb., and the unicolorous type." Hübner's type may be described as,—“The anterior wings dark purplish brown, with blackish transverse lines; reniform yellowish. Hind wings purplish grey, with a darker margin.” Mr. Dobrée writes of the Canadian type:—“*Leucostigma*, so far as my specimens permit me to judge, is rather of a bistre- than an umber-brown, and mottled rather than unicolorous” (*in litt.*). Of the type, Dr. Staudinger writes:—“Al. ant. unicolor. nigricant. flavo vel albo-maculatis.” Hübner's type certainly is not “*albo-maculatis*,” but “*flavo-maculatis*.” Mr. Dobrée writes:—“Both forms occur on the Amur, but apparently *fibrosa*, Hb., the less commonly (Graeser, 'Berl. Ent. Zeits.,' 1888). My specimen of *leucostigma* from there agrees with Hübner's type. I have specimens, also from Canada, of both varieties” (*in litt.*). The principal varieties are:—

α. var. *albipuncta*, mihi.—Unicolorous purplish brown (like the type), umber-brown or blackish, with faint traces of transverse markings, but with reniform white instead of ochreous. I have taken this form at Greenwich, and have a long series of it, taken by the Rev. G. H. Raynor in Wicken Fen; and Mr. Percy Russ has captured a considerable number of this variety, with var. *intermedia* and the type, in the neighbourhood of Sligo. Mr. Collins, of Warrington, takes this form a few miles from that town, together with the type and var. *intermedia*. Mr. Reid writes:—“This species is very scarce and local here (Pitcaple, Aberdeen); all those I have taken are referable to var. *albipuncta*. I have not seen any other forms here” (*in litt.*).

β. var. *intermedia*, mihi.—(1) *intermedia-albo*.—Anterior wings of a deep umber-brown, with two pale (slightly ochreous) transverse basal lines, and a paler orbicular; reniform white (sometimes reticulated), and standing on a white geminated line (part of median nervure); a pale oblique transverse streak from apex to inner margin, and a pale wavy line parallel to hind margin. (2) *intermedia-flavo*.—The same as *intermedia-albo*, but reniform ochreous. I have var. *intermedia* from Wicken and Sligo; Mr. Collins also takes this variety in the neighbourhood of Warrington. The Irish specimens are particularly bright, but not red, like Hübner's *fibrosa*.

γ. var. *fibrosa*, Hb.—Hübner's figure 385, *fibrosa*, may be described as, “Anterior wings bright red, with dark greyish outer margin, and darker red around the stigmata; reniform very pale. Hind wings as in *leucostigma*.” This form may occur in Britain, but I have never seen specimens nor heard of any captures at all resembling it. Mr. Dobrée writes:—“The *fibrosa* from Canada are of a more generally sombre colouring, but otherwise similarly marked to the European ones” (*in litt.*).

A SUMMER'S MOTHING ON DARTMOOR.

BY MAJOR JOHN N. STILL.

It seems surprising that so few people know anything of this most lovely and interesting part of the country. Unique in itself Dartmoor possesses very many advantages over other summer resorts: the air has been described as the purest and strongest in England. Its Tors, of which the highest is Yes Tor (2050 ft.), and the immense extent of the moor, give the visitor that sense of freedom which is only felt in mountainous districts.

To the antiquary, naturalist, botanist, and entomologist, Dartmoor will always be interesting, and, as a humble collector of Lepidoptera, I give my experience of collecting, and a list of the captures I made during the past summer on the Moor, at from 700 to 2000 feet above the sea.

During the wet weather which prevailed the latter part of April, 1889, I only took *Xylocampa areola* (*lithoriza*). On the 1st of May I got some specimens of *Lobophora carpinata* (*lobulata*), and, after another spell of wet, *Melanippe galiata*, *Coremia ferrugata*, *C. unidentata*, *C. designata*, and *Rumia luteolata*. During the end of the month *Tephrosia crepuscularia* was numerous in the fir woods, and I took also *Venilia macularia*, *Odontopera bidentata* (abundant), *Tephrosia punctulata*, *Bapta temerata*, and *Hepialus humuli* (abundant). Sugar was of little use, and, although I sugared from April to November almost continually, I found it very unproductive till late in September. I took *Eupithecia lariciata*, *E. subfulvata*, *E. nanata*, *Macaria liturata*, *Adela cuprella*, and *C. viridella*.

When I first came to the neighbourhood my expectations were raised to the utmost by hearing wonderful accounts of the swarms of moths attracted by rhododendron blooms, and of the good collection made in 1888 over the same ground. This year, although we had masses of rhododendrons in bloom, they produced next to nothing. During June honeydew reigned supreme, and literally covered every tree, plant, and shrub. I worked the rhododendrons at and after dusk, and only took the following:—

Xylophasia rurea, *Hadena rectilinea*, *Cucullia umbratica*, *Chærocampa porcellus*, and *Dianthæcia cucubali*. By day, *Eubolia palumbaria*, *Ematurga atomaria*, and *Tanagra atrata* were abundant. I also secured *Thera firmata*, *Cidaria corylata*, *Emmelesia albulata*, *E. unifasciata*, *Melanippe fluctuata*, *Anticlea rubidata*, *Melanthia albicillata*, *Cidaria associata*, *C. dotata*, *Lomaspilis marginata*, *Boarmia repandata*, *Asthena candidata*, *Botys ruralis*, *Angerona prunaria*, *Pseudoterpna pruinata*, *Iodis lactearia*, and the pretty China-mark, *Hydrocampa stagnata*.

The extremely hot weather in June enabled me to use light with advantage, and up to the end of July I captured the following at light:—

Gonoptera libatrix, *Noctua triangulum*, *N. festiva*, *N. baja*, *N. xanthographa*, *N. brunnea*, *Agrotis exclamationis*, *A. porphyrea*, *Axylia putris*, *Hecatera serena*, *Mamestra brassicæ*, *Hadena oleracea*, *H. pisti*, *Leucania conigera*, *L. lithargyria*, *L. pallens*, *L. comma*, *Apamea basilinea*, *A. didyma*, *Mamestra sordida*, *Rusina tenebrosa*, *Spilosoma menthastri*, *S. lubricipeda*, *Dianthæcia capsicola*, *Caradrina quadripuncta*, *C. taraxaci*, *Plusia chrysitis*, *P. gamma*, *P. pulchrina*, *Crocallis elinguaris*, *Grammesia trigrammica*, *Phalera bucephala*, *Habrostola tripartita*, *Calymnia trapezina*, *Arctia caia*, *Smerinthus populi*, *Sphinx ligustri*, *Cidaria suffumata*, *Melanippe unangulata*, *Cleora lichenaria*, *Eucosmia undulata*, *Metrocampa margaritaria*, *Abraxas grossulariata*, and some magnificent specimens of *Geometra papilionaria* and *Ellopiæ prosapiaria*. Sugar and other means yielded the following:—*Apecta nebulosa*, *Nemeophila plantaginis*, *Selenia bilunaria*, *Callimorpha dominula*, *Acronycta tridens*, *Halia vaularia*, *Acidalia straminata*, *A. aversata*, *Thyatira batis*, *Hydræcia nictitans*, *Mania typica*, *Miana strigilis*, *Eubolia limitata*, *Pericallia syringaria*, *Uropteryx sambucaria*, *Melanippe sociata*, *Hypsipetes sordidata*, *Emmelesia affinitata*, *Triphæna fimbria*, *T. ianthina*, *T. pronuba*, *T. comes*, *Acronycta rumicis*, and *A. ligustri*.

The wild unsettled weather from the 1st to the middle of August rendered mothing impossible. I took *Gnophos obscurata* by day, and *Polia chi*, which swarmed at sugar. On the 17th I captured one of the best moths I got, viz., *Stilbia anomala*, and afterwards took fourteen specimens, mostly at dusk, flying over long grass; also *Cidaria miata* and *C. siterata*. Light continued to answer until the end of this month, and I secured by its means a fine series of *Neuronis popularis*, *Luperina cespitis*, and *L. testacea*. Also *Noctua neglecta*, *Hydræcia micacea*, *Cilix glaucata*, *Sphinx convolvuli*, *Epione apiciaria*, *Eugonia alniaria*, and the inhabitant of humble-bees' nests, *Aphomia sociella*. August sugaring gave me *Amphipyra tragopogonis*, *A. pyramidea*, *Noctua c-nigrum*, *N. plecta*, *Xanthia fulvago* and *X. flavago*. I took *Pelurga comitata* and *Anaitis plagiata*.

In September I captured *Eugonia quercinaria*. Sugar now seemed to improve; there were many more moths on it, and from this date to the end of October I took at it *Hadena protea*, *Agrotis suffusa*, *A. saucia*, *A. segetum*, *Epunda nigra*, *Xylina socia*, *X. ornithopus*, *Anchocelis lunosa*, *A. pistacina*, *A. rufina*, *Agriopis aprilina*, *Miselia oxyacanthæ*, *Oporina croceago*, *Scopelosoma satellitia*, and *Calocampa exoleta*.

In conclusion, it cannot be expected that 700 feet above sea-level can be so prolific as lower ground, and no doubt want of knowledge caused me to overlook many species; but I would strongly recommend any entomologist wishing for fine air and scenery, combined with collecting, to try a summer on Dartmoor.

Langstone, Horrabridge, Nov. 12, 1889.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

RHOPALOCERA BRITANNICA.—Messrs. John T. Carrington and F. W. Frohawk intimate that they are about to produce, under this title, a new and carefully prepared monograph of the British butterflies, which will be very fully illustrated by coloured and plain plates, giving life-histories of every species drawn from living ova, larvæ, pupæ and imagines. The authors state that they have already a large amount of material in hand, but invite the assistance of the readers of the 'Entomologist,' by requesting loan of specimens for figuring, and local lists of species with notes. Further particulars are to be duly announced. Communications should be addressed, "JOHN T. CARRINGTON, 'Field' Office, Strand, London, W.C."

COLIAS EDUSA IN 1889.—Additional records of captures are:—

Lancashire.—A good many specimens have been taken in this district during August and September.—G. PODMORE; Charney Hall, Grange-over-Sands, October 25, 1889.

Staffordshire.—Two specimens were noticed at Bar Hill, in the parish of Madeley, by Mr. F. W. Dutton, of Newcastle-under-Lyme, when out partridge-shooting in September. Mr. Dutton was formerly a collector, and he therefore could not be mistaken.—(Rev.) THOS. W. DALTRY; Madeley Vicarage, Staffs.

Shropshire.—On the occasion of an excursion of the North Staffordshire Naturalists' Field Club and Archæological Society to Hawkstone, Lord Hill's seat in Salop,—on Sept. 12th, I saw a male specimen of *C. edusa*, caught by a young man who was out with the Club, in the park at Hawkstone.—(Rev.) THOS. W. DALTRY; Madeley Vicarage, Staffs.

Hants.—Last season *Colias edusa* was fairly numerous at Gosport, Mr. Larcon meeting with eight one day at Hillhead, and others were reported,—also seen by myself,—from Stokes Bay and other places on the Solent.—W. T. PEARCE; 111, High Street, Gosport.

Devonshire.—During the second week in August my father took five males and one female of this species, on a railway-bank at Dawlish, and saw several others.—C. NICHOLSON; 202, Evering Road, Upper Clapton, London, N.E.

EPINEPHELE TITHONUS VAR.—In August I caught eight specimens of *E. tithonus*, seven females and one male, each having two additional eye-spots on the upper wings. They are all more or less injured (*vide* Entom. xxii. 306). I think they must be sought for earlier in the season.—M. CRASKE; Newacott, Bridgerule, Holsworthy, Devon, December 7, 1889.

ACHERONTIA ATROPOS IN 1889.—The following records of the occurrence of *Acherontia atropos* during last year, have been received:—

Yorkshire.—At the close of the month of August, we met with a batch of the larvæ of the death's-head moth at Hornsea. They were feeding on the so-called "tea-tree" (*Lycium barbarum*), one of the Solanaceæ. We got a dozen that were nearly full-fed. These were placed, with their food-plant, under a garden bell-glass, where they continued to feed for a week on the leaves of the tea-tree, the branches of which they soon stripped of their foliage. Another change, and they gradually began to make their way into the soil, burrowing down several inches, and forming an earthen

case wherein to pupate. The case, I may remark, was made up of minute granules of earth and sand, with a few tiny stones intermixed; but I could find no flossy material, even under a strong lens. Herein they remained, apparently quiescent, till the 7th of November, when the first moth emerged from its pupal garments, and in half an hour, or a little more, the wings were fairly expanded, and assumed their full proportions. Every other afternoon the moths have put in an appearance, till the number has nearly equalled the number we originally got. Among the batch are only three cripples, and one pupa that is lively but has not yet emerged. Of the dozen caterpillars, seven were brownish olive, with the anterior segments, as Stainton remarks, white, the white being well defined and conspicuous. I must leave it to students of colour-varieties to tell us how such discrepancies arise. Food cannot be the cause, since all fed alike. Again, some moths have the skull-like mark on the thorax white, and some dusky. Kaltenbach tells us that the larva on the Continent feeds on the potato, thornapple, jasmine and mock-orange (*Philadelphus*). Prof. Hessner has noticed several caterpillars feeding on the trumpet-flower (*Catalpa*).—PETER INCHBALD; Hornsea, Holderness, November 20, 1889.

Cheshire.—A full-fed larva was sent in here on the 7th of September last; it was taken in a potato-field near Frodsham, and I have a second record from Manley, a neighbouring village near Delamere Forest.—R. NEWSTEAD; Curator, Grosvenor Museum, Chester.

Norfolk.—In September last larvæ were very common at Ingoldisthorpe and the surrounding district. — R. NEWSTEAD; Curator, Grosvenor Museum, Chester, October 17, 1889.

Sussex.—On August 6th I had brought to me two full-fed larvæ of *Acherontia atropos*. They were found in a potato-field at Pevensey Sluice, about three miles from here. I put them into a box partly filled with earth, and the next day they had both buried themselves. There were several others found in the same locality, but these were destroyed.—THOMAS HOWE; 3, Royal Terrace, Devonshire Road, Bexhill-on-Sea, November 10, 1889.

Hants.—The autumn of 1885 was in the Portsmouth district, as in many other parts of the country, remarkable for the number of specimens of *Acherontia atropos*, which were taken in all stages. Three imagines were found in the grounds of the Free Library; upwards of 170 larvæ and pupæ were obtained by Mr. R. Stent, from the Portsmouth potato-diggers; and more than 50 larvæ and pupæ were obtained by myself, from the diggers at Gosport. Of the pupæ which I obtained I tried to force 14, by keeping them in damp sawdust in a biscuit tin, on a very warm shelf in the shop. By Christmas 10 imagines had emerged, but the sides of the tin being too smooth, they could not crawl up, and falling on their backs, in their struggles to recover they tore their wings with their sharp claws, so that I only obtained three perfect specimens. Mr. Stent was not so successful with those he experimented upon. From October, 1885, until August of the present year, the insect disappeared altogether. At the end of last August, two full-fed larvæ were brought to me at Gosport. These I at once placed in a tin as before, but took the precaution to line the sides with thin rough wood. Early in September a pupa was brought to me by a potato-digger, and placed with the others. I was not able to obtain any more. A male emerged on October 21st, a fine female on October 22nd, and another female on November 17th; all three in perfect condition, and

their stridulating powers well developed.—W. T. PEARCE; 111, High Street, Gosport, November 20, 1889.

Isle of Wight.—*Acherontia atropos* was by no means uncommon here in September, when larvæ and pupæ were found singly scattered over a considerable area.—ALBERT J. HODGES.

Dorsetshire.—On 10th August last, I received by post a larva of *Acherontia atropos*, which was found feeding on vegetable-marrow in a nursery-garden at Blandford. It immediately pupated, and the perfect insect emerged and fully expanded on 18th October.—C. B. SMITH; 58, Rectory Road, Stoke Newington, N.

SPHINX CONVULVULI IN 1889.—The following additional records have been received:—

Co. Cork.—This Sphinx-moth was very common at Glandore this autumn, previously the capture of two or three only having come under my notice. I saw and captured about eighteen, all visiting the flowers of *Nicotiana affinis*. Every favourable evening in September a couple of these fine moths flew over the favoured plants, making a loud buzzing sound in their quick flight. — C. DONOVAN; Westview, Glandore, October 23, 1889.

Lancashire.—I took four *S. convolvuli* this year, on a patch of *Nicotiana affinis* in my garden, the dates being Augt. 24th, 29th, Sept. 8th, 13th.—G. PODMORE; Charney, Hall, Grange-over-Sands, October 25, 1889.

Isle of Wight.—I can add two captures of *S. convolvuli* to your list, which specimens came to petunia bloom on Sept. 11th and 12th last.—ALBERT J. HODGES.

DEILEPHILA EUPHORBIAE.—This very rare insect in Britain has this year re-appeared. A young friend, this autumn, came upon thirteen nearly full-fed larvæ, feeding upon *Euphorbia paralias*. They all very shortly after capture pupated, though three of them died in the process. The remaining ten are at the present moment healthy pupæ in my possession. I believe it is now many years ago since the larvæ of *D. euphorbiae* were last taken in this country. The above are British beyond all doubt.—(Rev.) J. SEYMOUR ST. JOHN; 42, Castlewood Road, Stamford Hill, N., November 22, 1889.

SMERINTHUS POPULI, RAPID DEVELOPMENT OF.—It may be of interest to note that a young friend of mine, living near London, has bred several specimens of the above in August last, from ova laid two months before.—J. M. ADYE; November 20th, 1889.—I found a full-fed larva of *S. populi* at Southsea, on July 14th, which pupated and appeared as a moth on the 14th August.—W. T. PEARCE; 111, High Street, Gosport.

SMERINTHUS TILIAE: MALES ASSEMBLING.—Last year, I again, in Surrey, took about a dozen *S. tiliae*, assembling round a captive female.—HARRY M. SEE; 4, St. Paul's Close, Walsall.

PARASITES OF BOMBYX RUBI.—When preserving some of the larvæ of *Bombyx rubi*, I came to an unusually fine specimen and which to all appearance looked as healthy as the others. Upon emptying it I found that it was completely filled with nearly full-grown ichneumon larvæ. These I found, upon preserving them in spirits, to number fifty-six. This, I think, is an exceedingly high number to be enclosed in one larva.—A. LIONEL CLARKE; Barton, Gloucester.

EPIONE PARALLELARIA VAR.—Whilst collecting Lepidoptera early in July, 1889, a short distance from York, I had the good fortune to take the very rare variety of the extremely local *E. parallelaria* (*vespertina*), along with several type specimens. The variety is of a dark uniform brick-red colour, and has the usual dark border.—WILLIAM HEWETT; 3, Wilton Terrace, Fulford Road, York, October 20, 1889. [This variety is more commonly bred than captured; some years not unfrequently.—ED.].

METROCAMPA MARGARITARIA VAR.—On July 29th, 1889, I bred a beautiful variety of this elegant species, with all the cilia pale red, which seems to be a continuation of the red streak at the apex of the fore wings. The cilia thus coloured adds much to the beauty of the insect.—R. NEWSTEAD; Grosvenor Museum, Chester.

ODONTOPERA BIDENTATA VAR.—I took a fine variety of *O. bidentata* on the 18th May last, which is perfectly black all over. — HARRY M. SEE; 4, St. Paul's Close, Walsall.

IRREGULAR EMERGENCE OF LEPIDOPTERA.—I obtained some ova of *Nemeophila russula* in 1889, which hatched in due course. Two of the larvæ fed up rapidly, pupated, and became perfect insects on the 2nd September. The remainder are now about half grown, and are behaving as might be expected from them. Broods of *Melanthia ocellata* and *Euplexia lucipara* have acted in a similar manner; and of two pupæ of *Notodonta ziczac*, one has already emerged, but not the other. — C. NICHOLSON; 202, Evering Road, Upper Clapton, N.E.

COLORADO ENTOMOLOGY.—In Entom. xxi., pp. 298—305, I gave an account of some entomological explorations in Eastern Custer Co., and S.W. Pueblo Co., Colorado, enumerating the species taken, so far as then identified. In Entom. xxii. I added three Hymenoptera to the list. Since then I have obtained the names of various other species taken, which I quote below, as a further contribution to the fauna of this interesting region. For identifications I am indebted to Prof. A. S. Packard, Dr. G. H. Horn, Dr. John Hamilton, Lord Walsingham, and Mr. W. H. Edwards. (1.) E. Custer Co.:—*Saprinus sphaeroides*, Lec., *Coccinella 9-notata*, Hbst., *Epuraea papagana*, *Listrus senilis*, Lec., *Desmaris constrictus*, *Smicronyx fulvus*, *Papilio asterias*, Fab., *Pyrgus tessellata*, Scudd., *Pamphila nevada*, Scudd. (2.) S.W. Pueblo Co.:—*Dendroctonus terebrans*, *Amara fallax*, Lec., *Badister obtusus*, *Diploaxis heydeni*, *Serica curvata*, Lec., *Diabrotica atripennis*, *Ditylus obscurus*, *Tomicus pini*, Say, *Tachyporus jocosus*, Say, *Crocota brevicornis*, Walker, *Tolyte*, n. sp., *Pædisca dorsisignatana*, Clem., *Psecadia dicostrigella*, Cham., *Epyris monticola*, Ashm., n. sp.—T. D. A. COCKERELL; West Cliff, Custer Co., Colorado, October 19, 1889.

NOTES FROM NEW ZEALAND.—We have again been favoured with an unusually fine winter in New Zealand, as the following notes on insects observed during August and September will sufficiently show, seeing that these two months are the equivalents of February and March in Europe. On July 31st my brother saw the first hibernated specimen of *Vanessa gonerilla*, and on Aug. 13th they were very abundant in the Botanical Gardens, as well as *Ichneumon mediator* and several Diptera. On Aug. 21st I found a large number of the full-grown larvæ of *Nyctemera annulata* on the New Zealand groundsel (*Senecio bellidioides*), but saw no perfect insects. I also

opened a nest of *Formica zealandica*, which contained large numbers of winged males and females, so that I conclude this species takes its conjugal flight in the spring, whilst that of *Atta antarctica* occurs in the autumn. On August 29th and 31st I was engaged in collecting Coleoptera, and, besides taking several of the *Pselaphida*, succeeded in obtaining four or five specimens of *Otiorhynchus sulcatus*, a somewhat uncommon species in New Zealand. September has been a warm wet month. The commonest species of Lepidoptera was *Pasiphila bilineolata*?, of which I managed to obtain a good series, and hope, with the assistance of Mr. Meyrick, to be able at last to rescue that unfortunate insect from the chaotic condition in which it has so long been involved. Sept. 22nd was a lovely spring day, and on visiting an old locality, where I have collected at least weekly for upwards of seven years, I was astonished to meet with *Vanessa otea*, a species hitherto only recorded from localities as far north as Napier and New Plymouth. I also saw many hibernated specimens of *Vanessa cardui*, so it appears likely that we are again to be favoured with this interesting species in unusual numbers. I should also mention that during the last week in September, a young friend of mine captured two male specimens of *Charagia virescens* at a shop window in Palmerston North, attracted by the light. It will therefore, perhaps, be necessary to somewhat modify the statement in my former paper as to the rarity of that species in the imago state (Entom. Feb. 1885). In one of these specimens the white spots on the forewings are slightly larger than usual, almost forming a continuous band from the costa to the inner margin of the wing. The other is typical.—G. V. HUDSON; Wellington, New Zealand, October 3, 1889.

HYDRADEPHAGA NEAR LONDON. — My search for aquatic beetles in a pond near Tottenham during the present month, resulted in the capture of nineteen specimens of *Hydrophilus piceus*, sixteen of which were perfect. The elytra of one were somewhat deformed, so I returned it to its haunts. *Dytiscus marginalis* was also very plentiful there. The pond was large and deep, but the beetles were amongst the weeds near the surface and about three or four feet from the edge of the pond. Near Stamford Hill, about the same time, I also got *Dytiscus circumflexus* (2), *D. punctulatus*, and *Hydrous caraboides*. With *H. piceus* were also four nice specimens of *Ranatra linearis*.—F. MILTON; 164, Stamford Hill, N., Nov. 20.

NEW VIEWS ON THE SUBORDER HOMOPTERA. — Burmeister says truly, "a system can only separate and connect where Nature itself has marked separation and connection." I will not involve myself in a discussion as to the sharp and natural distinctions between suborders and families. As Mr. Distant (Entom. xxii. 360) seems to be clear in his mind on this point, I, in company with others, should value his definitions, or those, indeed, of any one competent to give them. Species, for practical purposes, are natural facts. Families are inferences from facts, which is a very different thing. I now gather that "les Cigalles Muettes," of Latreille, including the Fulgorinæ, Cercopinæ, Jassinæ, &c., are neither Cicadæ nor Cicadidæ, but that they range as equally distinct groups with Aphis, Coccus, and Psylla. But I suggest that the authorities of great names (the pioneers of Zoology) are not to be dismissed simply because they seem to be not "modern." My critic "knows no silent Cicadidæ." However, under one or more of the following terms,—Cicadæ, Cicadarinæ, Cicadidæ, Cicadinæ, Cicadellidæ, Cicadinen, and Cicadelles,—Les Muettes are

grouped by Linnæus, Fabricius, Schrank, Germar, Burmeister, Fallen, Kirschbaum, Sahlberg, Fieber, Walker, Edwards, and Scudder. The author of this note finds himself in good company as to the choice of a title to his forthcoming illustrations of this group of insects. Dr. F. Xavier Fieber published his 'Katalog. d. Europæischen Cicadinen' (embracing the Fulgoridæ, &c.) in 1872. The posthumous papers of this "grand hémiptériste" were edited by M. Reiber, assisted by Messrs. Puton and Lethierry, in 1875. Dr. Stål dedicated his fourth volume of 'Hémiptères' to his friend Dr. Fieber in 1866. I fail to see why the author of 1875 is to be dismissed as an authority on European Cicadinae, as being the least modern of the two. A friend proposes the names Stridulantes and Silentes, instead of the neuter names Stridulantia and Silentia, as inserted in my sketch-plan; they seem to be better.—G. B. BUCKTON.

MORE NOTES FROM THE NEW FOREST.—I can corroborate Mr. Blaber's remarks (Entom. 261), as to the general scarcity of Lepidoptera, and the complete failure of "sugar" at Lyndhurst in 1889. I went there on the 25th June and stayed till the 10th July. The first ten days were all that could be desired as far as the weather was concerned, but after that rain set in, and, I believe, continued intermittently till the middle of August. Of Diurni, *Lycana agon* was common and in splendid condition, but, as usual, rather local. Of *L. icarus* I did not see a single specimen, and only one *Thecla quercus*. My experience, however, does not coincide with Mr. Blaber's as regards *Argynnis paphia*. I only saw a few males at first, but both sexes became very abundant towards the end of my stay. Of the variety *valesina* I saw two, one of which I took. I hear they have been rather common there this season. *A. adippe* was fairly common, but I only took one *aglaia*. *Limenitis sibylla* was by no means scarce, as I frequently saw two or three at once. The Pieridæ were conspicuous by their almost total absence. *Epinephele ianira* and *E. hyperanthes* were extremely abundant, as usual. *E. tithonus* and *Hesperia thaumas (linea)* were just coming out, though *H. sylvanus* was common. I was too early for *Vanessa io*, *V. atalanta*, *Pararge megæra*, and *Gonopteryx rhamni*, though a few hibernated specimens of the latter were still to be seen. Of *Melanargia galatea* I took five specimens in an enclosure near the station. Of moths, *Nemeophila russula* was not uncommon on the heaths; but night-flying moths were remarkably scarce, especially Noctuæ. *Larentia pectinataria*, *Melanippe montanata*, and *Acidalia remutata*, seemed to be the principal things, and *Tortrix viridana* was a perfect pest, when flying, from its knack of looking like any other insect but itself. I noticed that the trees did not present such a miserable appearance as they did last year, which was, perhaps, on account of the comparative scarcity of larvæ.—C. NICHOLSON; 202, Evering Road, Upper Clapton, N.E.

ERRATUM.—Entom. December, 1889, in Mr. Bignell's communication, page 306, lines 5 and 7 from foot, for *Trogus exaltorius* read *T. exaltatorius*.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON. — December 4th, 1889. — The Right Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. Prof. Franz Klapálek, of the Zoological Department, Royal Museum, Prague, was elected a Fellow of the Society. Mr. W. L. Distant

exhibited, on behalf of Mr. Lionel de Nicéville, a branch of a walnut tree, on which was a mass of eggs laid by a butterfly belonging to the *Lycænidæ*. He also exhibited two specimens of this butterfly which Mr. de Nicéville had referred to a new genus and described as *Chatoprocta odata*. The species was said to occur only in the mountainous districts of North-West India, at elevations of 5000 to 10,000 feet above the sea-level. Dr. D. Sharp exhibited the eggs of *Piezosternum subulatum*, Thunb., a bug from South America. These eggs were taken from the interior of a specimen which had been allowed to putrefy before being mounted. Although the body of the parent had completely rotted away, the eggs were in a perfect state of preservation, and the cellular condition of the yolk was very conspicuous. Dr. Sharp also exhibited a specimen of *Pacilochroma lewisii*, Dist., a Pentatomid bug from Japan of a dull green colour, which when damped with water becomes almost instantly of a metallic copper colour. Mr. J. H. Leech exhibited a large number of Lepidoptera recently collected for him by Mr. Pratt in the neighbourhood of Ichang, Central China. The collection included about fifty-four new species of butterflies and thirty-five new species of moths. Capt. Elwes observed that he noticed only two genera in this collection which did not occur at Sikkim, and that the similarity of the insect fauna of the two regions was very remarkable. He added that about fifteen years ago, in a paper "On the Birds of Asia," he had called attention to the similarity of species inhabiting the mountain ranges of India, China, and Java. Mr. M'Lachlan remarked that he had lately received a species of dragonfly from Simla which had previously only been recorded from Peking. Mr. Distant said he had lately had a species of *Cicada* from Hongkong, which had hitherto been supposed to be confined to Java. Mr. W. H. B. Fletcher exhibited a preserved specimen of a variety of the larva of *Sphinx ligustri*, taken in a wood near Arundel, Sussex. Mr. W. White asked if the larva was normal in its early stage; he also exhibited drawings of the larvæ of this species, and called especial attention to one of a variety that had been exhibited at a previous meeting by Lord Walsingham. Mr. F. D. Godman read a long letter from Mr. Herbert Smith, containing an account of the Hymenoptera, Diptera, Hemiptera, and Coleoptera he had recently collected in St. Vincent, where he was employed under the direction of a Committee of the Royal Society, appointed to investigate the Natural History of the West Indies. A discussion followed, in which Dr. Sharp, Capt. Elwes, Lord Walsingham, and Mr. M'Lachlan took part. Capt. Elwes read a letter from Mr. Doherty, in which the writer described his experiences in collecting insects in the Naga Hills by means of light and sugar. Mr. Doherty expressed an opinion that light, if used in very out-of-the-way places, rather repelled than attracted insects; in fact that they required to be accustomed to it, and that the same remarks applied to "sugar." Colonel Swinhoe said that the attractive power of light depended very much on its intensity, and on the height of the light above the ground. By means of the electric light in Bombay he had collected more than 300 specimens of Sphingidæ in one night. Mr. J. J. Walker, R.N., stated that he had found the electric light very attractive to insects in Panama. Mr. M'Lachlan, Dr. Sharp, Mr. Leech, Capt. Elwes, the Rev. Canon Fowler, Mr. A. J. Rose, and others continued the discussion. Mr. Lionel de Nicéville communicated a paper entitled "Notes on a new genus of *Lycænidæ*." Mr. F. Merrifield read a paper entitled "Systematic temperature experiments on some

Lepidoptera in all their stages," and exhibited a number of specimens in illustration. The author stated that the darkness of colour and the markings in *Ennomos autumnaria* resulted from the pupæ being subjected to a very low temperature. In the case of *Selenia illustraria*, exposing the pupæ to a low temperature had not only affected the colour of the imago, but had altered the markings in a striking manner. Lord Walsingham observed that it appeared that exposure to cold in the pupa-state produced a darker colour in the imago, and that forcing in that stage had an opposite effect; that insects subjected to glacial conditions probably derived some advantage from the development of dark or suffused colouring, and that this advantage was, in all probability, the more rapid absorption of heat. He said he believed that an hereditary tendency in favour of the darker forms was established under glacial conditions, and that this would account for the prevalence of melanic forms in northern latitudes and at high elevations. Capt. Elwes, Mr. Jenner Weir, Dr. Sharp, and others continued the discussion.—H. GOSS, & W. W. FOWLER, *Hon. Secs.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —November 14th, 1889.—T. R. Billups, F.E.S., President, in the chair. Messrs. E. H. R. Hillsworth, of Forest Gate; T. Hudson, of Battersea; M. Farrant, of Pimlico; and J. A. Revell, of Stoke Newington, were elected Members. Mr. Jäger exhibited *Dianthæcia irregularis*, *Agrophila trabealis*, and *Neuria reticulata*, from near Brandon, Suffolk; also *Agrotis ripæ*, bred from larvæ taken in S. Wales; and read notes with reference to rearing this species. He said the larvæ required about three feet of sand in which to hybernate, although they pupated just below the surface. He had not found the larvæ cannibals, although they were frequently stated to be so. Mr. Tugwell, strongly divergent forms of *Agrotis tritici* and *A. cursoria*, from English, Irish and Scotch localities. Mr. Adye, varieties of *Anchocelis lunosa* taken at Christchurch. Mr. Wellman, a specimen of *Nemeophila plantaginis* var. *hospita*, taken in Yorkshire, 1860. Mr. Tutt, a drawer of *Gnophos obscuraria* from many localities, arranged to show its range of variation. Mr. R. Adkin, *Gnophos obscuraria* from Folkestone, Eastbourne, and Lewes; and long and varied series of *Acidalia marginipunctata* from Eastbourne; on behalf of Mr. W. J. Austin, extreme forms of *Gnophos obscuraria*, *Angeronia prunaria*; females of *Lycæna icarus* shot with blue, and a male of pale lilac colour; and a variety of *Argynnis aglaia* having the wings semi-transparent. Mr. Adkin also exhibited, on behalf of Mrs. Hutchinson, a species of *Scoparia*, probably *mercurella*. Mr. Carrington, *Eupithecia extensaria*. Mr. McLachlan, varieties of *Lycænidæ*, one of which he thought might be an hermaphrodite specimen of *L. icarus*. Mr. Carpenter, *Hepialus virensis*, attacked by the fungus *Cordiceps Robertsii*, from New Zealand, which gave rise to a discussion as to how the germs of the fungus were received by the larva.

November 28th, 1889.—The President in the chair. Messrs. M. Cameron; L. H. Strong, of Hackney; C. G. Barrett, F.E.S., of King's Lynn; F. P. Trewicke; A. J. Robertson; A. V. Legros, of Hammer-smith; L. W. Harris, of Forest Hill; C. H. Lemmon, of Rotherhithe; W. Howgrave, of Blackheath; and W. E. Nicholson, of Lewes, were elected members. Mr. Jenner Weir exhibited specimens of *Limnas*

chrysippus and *Hypolimnas misippus*, received from Dr. Percy Rendall from the Gambia; also *L. dorippus* from Eastern Africa, and a female mimic of *H. misippus*; *L. chrysippus*, from Ceylon, and its mimic *H. misippus*; *L. chrysippus*, from Natal, with a white spot on the under wings similar to that of the intermediate female of *H. misippus*, referred to above; and, lastly, a female of *H. misippus*, which appeared to mimic a species of *Limnas* intermediate in colour between *L. dorippus* and *L. chrysippus*, and said it would therefore appear that where these two species of *Limnas* were found together and hybridised, the mimicking female of the *Hypolimnas* was found similar in colour to the hybrid. Mr. Fenn, a long series of *Hybernia aurantiaria* from N. Kent. Mr. Elisha, bred specimens of *Deilephila galii* bred from pupæ forced during March, at a temperature of from sixty to seventy degrees, emerging from fourteen or sixteen days after being placed in this heat, and he had not lost any pupæ during this process. Mr. Billups read a paper contributed by the Rev. W. F. Johnson, "A Further List of the Irish Staphylinidæ, compiled in 1889." The Secretary read two contributions from Mr. T. D. A. Cockerell, "Hybrids and Mongrels," and "Do the Colours of Living Insects fade?"—H. W. BARKER, *Hon. Sec.*

REVIEWS.

Proceedings of the Dorset Natural History and Antiquarian Field Club.
Dorchester: 'Dorset County Chronicle' Office. Vols. ix. and x.
1888—89. Price Seven and Sixpence each.

WHEN one turns over the pages of these handsomely produced volumes, one feels regret that among all the varied societies there is none for the collation and indexing of all the proceedings or transactions of the various local and metropolitan scientific clubs or societies. To a private individual it seems almost impossible to find what papers, bearing upon any particular subject, have thus been overlooked. Here is an example,—a society not nearly sufficiently known, doing excellent work in Entomology and otherwise, publishing papers with coloured and plain plates of the greatest use to the systematic entomologist. In these two volumes we may particularly refer to (in vol. ix.), "*Butalis siccella*, a moth new to Britain"; (in vol. x.), "New and Rare British Spiders," "A New Species of *Epischia*," "Supplement to the Lepidoptera of the Isle of Purbeck," and others. Entomologists will not begrudge the expenditure necessary in obtaining these Proceedings.—J. T. C.

The Butterfly, its Life-history and Attributes. By JOHN STUDLAND.
London: T. Fisher Unwin. 1889. Price One Shilling.

ANYTHING which draws attention to Entomology and so begets students in that subject should be welcomed, no matter how elementary be the work. This is evidently the object of the little work under consideration. It is a pity, however, that in choosing blocks for illustration more accuracy of delineation was not observed, for if a beginner has to learn a thing, it is just as well to do so once for all, and not have to relearn his lesson at a later period. It will be a useful little book for those who know nothing of
omology.—J. T. C.

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EDITORIAL NOTICE.

It is with great pleasure I have to announce that the Reference Committee of the 'Entomologist' will henceforth be increased and strengthened by the addition thereto of Mr. WM. LUCAS DISTANT, F.E.S., &c.; Mr. MARTIN JACOBY, F.E.S.; Mr. JOHN HENRY LEECH, B.A., F.L.S., F.E.S., &c.; Dr. DAVID SHARP, F.Z.S., F.E.S., &c.; Mr. G. H. VERRALL, F.E.S.; and Mr. W. WARREN, M.A., F.E.S. All these gentlemen are so well known as authorities in their particular fields of biological research that it is unnecessary for me to say another word on introducing them to the readers of the 'Entomologist.' As Editor, however, of this magazine, I desire to tender them my very sincere thanks for so kindly according me their valuable aid.

In discharging the duties of my new position it is a deeply-felt gratification to me to know that I retain the confidence and shall have the esteemed assistance of my former colleagues, Messrs. BILLUPS, FITCH, JENNER WEIR, and Dr. BUCHANAN WHITE. I take this occasion to express my gratitude to these gentlemen for their support.

As regards the programme of the 'Entomologist,' it is not proposed to depart very materially from the lines upon which this magazine has so far been successfully conducted. As hitherto, papers, notes, &c., dealing with the insect-fauna of the British Islands will be primarily considered; but to be in touch with the requirements of a not inconsiderable section of British entomologists, articles, by English and foreign authors, on insects of all Orders, from various parts of the world, will appear more frequently. Additional pages will be given when lengthy faunistic papers are published.

RICHARD SOUTH.

ENTOM.—FEB. 1890.

D

NEW SPECIES OF LEPIDOPTERA FROM CHINA.

By J. H. LEECH, B.A., F.Z.S., &c.

THE following are the descriptions of some of the more important of the new species captured by Mr. Pratt, who collected for me in the neighbourhood of Ichang, Central China, during the season of 1888. I regret that I am unable to figure them at present, but I hope to do so before long; and, in the meantime, I can only say that I shall always be most happy to show the types to anyone who takes an interest in the fauna of China.

ZETHERA SAGITTA, sp. n.

Creamy white; neurulation, apex, and margins of primaries black; some black scales along the upper portion of discoidal cell, which is partially divided by a black bar across its centre, a black wavy submarginal band extending to the second median branch, and a zigzag black line before the outer margin: secondaries have the submedian and median nerve and branch broadly black, but the other nerves are only narrow, a black zigzag line on the outer margin forms a series of arrow-heads, of which the veins represent the shafts. On the under surface the colour is rather more yellow, and the venation, except median and branches, narrowly blackish, the lines of the upper surface only faintly reproduced. Expanse, 78—90 mm.

Several specimens, including one example of the female, from Chang Yang, taken in June.

This species is allied to *Z. hestioides*, Feld., from the Philippines.

MELANARGIA HALIMEDE.

Arge halimede, Mén. Bull. de l'Acad. xvii. p. 216; Schrenck's Reisen, p. 37, t. iii., fig. 6 ♂, 7 ♀.

Melanargia halimede, var. *meridionalis*, Feld. Wein. Ent. Mon. vi. p. 29 (1862); Leech, Trans. Ent. Soc., 1889, p. 101.

Melanargia halimede, Elwes, Proc. Zool. Soc., 1881, p. 903; Leech, l. c., 1887, p. 425.

An extensive series from Chang Yang, taken in July.

The majority of the specimens are more or less of the typical form of the species; some of the examples agree with the specimens figured by Ménétériés; others have the well-defined black bands on the upper, and ocelli on the under, surfaces, noticed by him. None of the specimens are, however, as dark as the palest example from Japan.

One form, of which there are several examples, is so very conspicuous that I have ventured to describe and give it a varietal name.

Var. *MONTANA*.—Central band very narrow, and the outer border is only faintly indicated, whilst on the secondaries the black markings are absent, excepting slight traces of a ring in the first median interspace, and a slender dentate submarginal line.

LETHE OCCULTA, sp. n.

Allied to *M. oculatissima*, Pouj. (Ann. Ent. Soc. Fr., 1885, p. xxiv.), but much darker brown, the spot at inner angle of primaries is without white

pupil, and of the same size as that at apex. On the under surface of primaries there are but four ocelli, and the second and third of these are very indistinctly formed: on the secondaries there are six ocellus-like spots, but the third and fourth are very shadowy; basal two-thirds of primaries brown, apical third and whole of secondaries pale olive brown, all the wings sprinkled with ochreous scales and traversed by dark brown lines. Expanse, 65 mm.

One male example, taken in July, at Chang Yang.

I have not seen the type of *M. occulatissima*, Pouj.; the comparison is with the original description and with named specimens in Mr. Oberthür's collection.

LETHE CYRENE, sp. n.

Brown, tinged with ochreous; apical third of primaries slightly paler, divided off obliquely from just beyond the middle of costa to near inner angle, and containing a series of four small blackish spots, each placed at the interior end of a narrow longitudinal fold on the outer margin, an indistinct dark line parallel with outer margin. Secondaries with five black spots set in fulvous rings, the costal one of the series has a large white pupil, and the third is least in size, a small chestnut patch at anal angle; fringes white, chequered with brown, and preceded by a double line, following the contour of outer margin. Under surface ochreous brown; two short transverse brown bars intersect the discoidal cell, the space between them is pale ochreous, and the outer bar is continued below the median nervure to the inner margin; beyond the cell is a broad brown band, which traverses the wing in an oblique direction to the first median branch, below which it turns inwards and then outwards to the inner margin, this band is bordered externally with pale ochreous; a submarginal series of five small ocelli set in a transverse patch of pale ochreous is followed by two brown lines parallel with the outer margin, the interspace filled up with pale ochreous from opposite the first ocellus to inner angle; fringes grey, with a dark line at their base. Secondaries traversed by a pale ochreous stripe bordered with brown; this stripe does not attain the inner margin, and the outer edge bulges about the middle; towards the outer margin is a series of six ocelli set in a broad transverse patch of pale ochreous, the first ocellus near the costa is the largest, but does not greatly exceed the fourth and fifth, all have elongated white pupils and the sixth is double; a brown line, preceded by a whitish one, and followed by one of pale ochreous parallel with outer margin; fringes as above.

♀. Apical third of primaries paler than in the male, with a whitish costal dot on its inner edge, outer margin of secondaries more angulated; the under surface is pale brown, central third of primaries darker, enclosing a whitish bar which crosses the discoidal cell; secondaries with the costal mark of the male outlined in and partly filled up with brown. Expanse, 62—68 mm.

Five male and one female specimens, taken in June, at Chang Yang.

Allied to *L. syrcis*, Hew.

LETHE TRIMACULA, sp. n.

♂. Fuscous brown; apical third of primaries slightly paler, and enclosing a distinct ocellus. Secondaries with two ocelli near anal angle, the upper one with white pupil faint or entirely absent. Under surface of primaries grey-brown, apical third greyish clouded with pale brown, and divided off by a dark brown curved slightly wavy band; the discoidal cell is closed by a dark brown line, and divided transversely by another line of the same colour; ocellus very distinct; a dark brown line parallel with outer

margin is preceded by a zigzag one, and followed by one at the base of the pale grey fringes. Secondaries greyish, with five well-formed ocelli, that on the costa is very large and bipupilated, as also is the smaller one at anal angle; two brown lines traverse the disc, the outer curves half round the costal ocellus, and then proceeds in a series of waves to the inner margin; fringes and marginal lines as on primaries. The ocelli on both surfaces are ringed with pale fuscous. Expanse, 68—72 mm.

♀. Same as male, but apical third of primaries limited by a pale band.

Several males and one female from Chang Yang, taken in July.

LETHE NIGRIFASCIA, sp. n.

♂. Fuscous brown, darker on the outer margins. Primaries crossed by a black band which curves from the costa, and is not well defined until it reaches the third median branch, where it is dilated, as it also is at each succeeding vein to the inner margin. Secondaries have a submarginal series of six black spots set in pale rings, the first is largest, but does not greatly exceed the fourth, whilst the sixth is smaller and indistinct; a pale line parallel with outer margin. Fringes white, fuliginous at extremities of the nervules. Under surface ochreous brown, fuscous towards outer margin; a broad whitish bar crosses the discoidal cell; central transverse line whitish, ill defined, commencing as a blotch on costa, and bordering a faint reproduction of the black band of upper surface; a smaller white patch nearer the apex, and a pale line parallel with outer margin. Secondaries have two pale violet basal lines, the first is indistinct after passing the median nervure, but the second continues its course to the submedian, where it turns in and terminates at the internal nervure; beyond is another pale violet line, bordered inwardly with brown, running from costa to first median branch, where it turns sharply inwards and upwards for a short distance, then again turns and descends to the median nervure; a fourth pale violet line traverses the wing in a wavy course from costa to inner margin; this is bordered externally with various shades of brown and limits the outer third, which is somewhat darker than the rest of the wing, and has a series of six ocelli; the first four of these ocelli are surrounded with pale violet, but in the two last, which are larger, this colour is only distinct on their inner edge; the sixth ocellus is double; a pale violet line parallel with outer margin forms triangular blotches opposite the last three ocelli, that at the anal angle being the largest; fringes as above.

♀. Colour of the male, but there is no black band on primaries; a blackish shade, broadest near the costa, where it is bordered by some pale yellowish dashes, runs obliquely to beyond third median branch, and then curves inwards to the inner margin; some whitish spots towards apex. The under surface is pale fulvous, and the pale violet lines on the secondaries of the male are replaced in this sex by pale yellowish ones. Expanse: male, 70—74 mm.; female, 78 mm.

Two male and one female specimens, taken in August, at Chang Yang.

Allied to *Lethe* (*Debis*) *armandina*, Oberth., from Moupin.

LETHE LABYRINTHEA, sp. n.

♂. Brown, with an olivaceous gloss. Primaries have two dark clouds in the discoidal cell and a blackish central transverse band; from the outer edge of the last, rays are projected along the nervules to the outer margin, intersecting in their course a blackish transverse line; a second abbreviated waved blackish band extends from inner margin to second median nervule. Secondaries have a submarginal series of six black spots enclosed between two wavy ill-defined blackish bands, parallel with outer margin is a narrow

blackish line; fringes white, variegated with blackish at the extremities of nervules. Under surface pale ochreous, tinged with olivaceous; two brown bars in discoidal cell of primaries; central transverse line brown, oblique, with three deep indentations, and edged towards costa with yellowish; some pale spots near costa precede a suffused brownish marginal line. Secondaries with a grey-brown pale-edged band near the base, extending from costa to median nervure, beyond is a brown suffused line curving from costa to abdominal margin, and emitting a spur to the median nervure; central band of unequal width and edged externally with blackish, followed by a broad ochreous marginal band in which is placed a series of six ocelli, the third and fourth are rather indistinct, and all more or less completely encircled with lilacine white; an antimarginal line of the same colour edged on each side with black, and swelling out into lunules opposite the last three ocelli; fringes white, chequered with brownish at extremities of nervules.

♀. Paler; markings of primaries above same as on under surface of male, but with the addition of two small ocelli below apex. Expanse: male, 70 mm.; female, 80 mm.

Four specimens (two males and one female, Ichang, July; one male, Chang Yang, July).

Allied to *L. nigrifascia*, but may be at once separated by the different character of central band of primaries and the larger ocelli.

NEOPE RAMOSA, sp. n.

♂. Closely allied to *S. goschkevitschii*, Mén., from Japan, but the ground colour is dark chocolate-brown, the spots on primaries are smaller, nearly orbicular, pale yellowish buff in colour, and each pair between the median nervules are separated by a quadrate blackish spot. Secondaries have two pale yellowish buff longitudinal patches and three spots; the former each enclose an obscure ocellus and the latter are arranged in a longitudinal series; below are three black spots decreasing in size to the anal angle, the first is partially, the second distinctly, and the third indistinctly surrounded with pale yellowish buff. Under surface blackish, variegated with white and yellowish buff; primaries have a white-centred black spot enclosed in a whitish ring near apex, and below this is a nearly square white spot followed by two pairs of yellowish buff spots as above: secondaries have three basal spots as in *S. goschkevitschii*, but they are paler in colour and the lower one is much larger; the central band is greyish, very irregular in shape and bordered on each side with white. Expanse, 90 mm.

Two males taken in June and July, at Chang Yang.

NEOPE ROMANOV, sp. n.

♂. Chocolate-brown with olive reflections and a metallic green tinge in certain lights; venation not ochreous, there are two transverse series of small yellowish spots on outward half of primaries, but those towards costa are ill-defined. Secondaries have a marginal series of large black spots, each spot edged internally and externally with yellowish except that at outer angle, which is bordered on its hinder edge only. Under surface pale brown tinged with violet-grey. Primaries broadly streaked with ochreous grey along the inner margin; central brown band very narrow, bidentate near costa, then gently curved, emitting a short projection before its termination near anal angle; four antimarginal ocelli, the second almost filled up with white; two brown sinuated lines parallel with outer margin. Secondaries with three yellowish brown ringed spots at the base; the central band is grey-brown with a triple edging of brown, yellowish, and dark brown; seven very distinct antimarginal ocelli.

♀. The inner series of spots on upper surface of primaries distinct. Expanse, ♂ 74 mm., ♀ 80 mm.

Two male and one female specimens taken in July at Ichang. One male example, Chang Yang, July.

SATYRUS MACULOSA, sp. n.

♀. Dark greyish brown. Primaries with three large black yellowish ringed spots towards outer margin; the two lower ones are contiguous. Secondaries have two similar spots above anal angle; fringes pale grey tipped with darker. Under surface pale grey; basal two-thirds and outer margin of primaries thickly sprinkled with brownish; a dark brown line traverses the wing before the three large ocelli; three narrow black lines on outer margin enclose two whitish ones. Secondaries reticulated with brownish on basal two-thirds; ocelli five in number, the two nearest costa contiguous, the other three lie towards anal angle, the fifth least in size; a dark wavy submarginal line and two parallel with outer margin enclosing a whitish one; fringes pale grey. Expanse, 36 mm.

One female example taken in July at Chang Yang.

Allied to *Satyrus arvensis*, Oberth., but differs from that species in having five ocelli of equal size, and further in the absence of white pupils.

PARARGE CATENA, sp. n.

Brown suffused with fuliginous. Primaries traversed by an angulated indistinct dark line bordered externally with paler, most clearly towards costa; a submarginal series of six black spots set in ochreous rings, the first of which is very small and the last two larger than others; marginal line pale. Secondaries with a pale angulated central band and a submarginal series of six ochreous ringed black spots, the third very small and the sixth equal in size to the fourth and fifth, but ill-defined; a pale line parallel with outer margin; fringe pale ochreous, chequered with brown at the ends of nervules. Under surface of primaries grey-brown; a pale ochreous bar, edged with brown, crosses the discoidal cell, and is preceded by a small spot of the same colour; beyond the cell is an angulated dark line edged externally with pale ochreous; this edging forms a triangular patch at costa, and unites with a quadrate spot of the same colour on inner margin; there are six pale ochreous spots towards outer margin, all of which, with the exception of the first, have black centres with white pupils; beyond these is an interrupted short ochreous band, two pale ochreous lines enclosing a brown one parallel with outer margin. Secondaries brown, with an olive tint; some spots and an interrupted white band near the base; central band white, angulated and intersected at the angle by a short longitudinal bar; a submarginal series of six ocelli, the first bipupilated and the third very small, the first three are distinctly bordered externally with white and the last three less distinctly; lines parallel with outer margin whitish; fringes as above. In the female the white markings are rather broader. Expanse, 55 mm.

Seven male specimens taken in July, and one female captured in August, at Chang Yang.

In some respects this species agrees with *Pararge dumetorum*, Oberth., Etud. d'Ent. xl. pt. iv. fig. 20; but it is easily separated therefrom by the ocelli on both surfaces of primaries.

CALLEREBIA ALBIPUNCTA, sp. n.

♂. Primaries blackish brown, outer third paler, towards apex is a large round black patch, enclosing two small white spots encircled with pale fulvous; below is a brighter fulvous cloud. Secondaries blackish brown, paler along abdominal margin; towards anal angle is a fulvous-ringed black spot, enclosing a white dot; fringes tinged with grey. Under surface of primaries red-brown, apex and upper half of outer margin greyish; bipupilated ocellus as above; secondaries dark brown, traversed by innumerable irregular wavy lines; ocellus towards anal angle as above, and there is a white spot in each nervular interspace between it and the costa. Expanse, 54 to 60 mm.

♀. Discal area of primaries suffused with reddish, otherwise similar to male.

Allied to *C. sylvicola*, Oberth., and *C. pratorum*, Oberth. (Etud. d'Ent. xi.), but most closely to the last named; from both species it may, however, be separated by the series of white spots on under surface of secondaries.

Several male specimens taken at Chang Yang in July, and a number of both sexes from Ichang Gorge, taken in August.

This species is fairly constant in the character of marking, but two female examples have the white submarginal spots reproduced on the upper surface of secondaries. One of these specimens has the black patch on primaries pear-shaped, enclosing three white spots, and there is a small ocellus below it, near the outer angle.

CLEROME AEROPE, sp. n.

♂. Drab-brown. Primaries darker towards the outer margin; a conspicuous tuft of fulvous silky hairs on the interior edge of the median nerve near the base. Under surface brown; primaries paler along the inner margin with a triangular vitreous patch below the median nerve; all the wings traversed by three dark reddish brown lines, terminating at the submedian nervure; there are six small yellow spots on the primaries before the submarginal line, that nearest the costa punctiform, sometimes absent; on the secondaries there is a transverse series of five similar spots, the first is near the central line, the fourth and fifth approximate more to the submarginal, whilst the second and third are equidistant from either line. Fringes on both surfaces grey-brown, preceded by a slender brownish line.

♀. Colour of male; outer margin of primaries with a suffused blackish border, broad on costa and tapering towards outer angle; external margin of secondaries is also suffused with blackish. The vitreous patch and tuft of hairs are characters pertaining to the male only. Expanse, ♂ 78—89 mm., ♀ 84—100 mm.

A splendid series, taken in June and July, at Ichang.

This species is closely allied to *C. assama*, Westw., from Assam and Khasi Hills; but it is much paler in colour above, whilst beneath the spots are much smaller; the transverse lines are differently curved, and there is no disposition of the second to unite with the third above anal angle.

HESTINA NIGRIVENA, sp. n.

Whitish green; venation of primaries, and a streak above the submedian nervure, broadly blackish, as also is the median nervure of secondaries and its

branches, but the other veins of this wing are narrow in comparison; outer fourth of primaries black, enclosing a double row of spots of the ground colour; there is also an ill-defined blackish central transverse bar; on the secondaries there is a series of distinct black marginal spots and indications of a submarginal series; these last are placed in a very faint pinkish streak. Under surface, colour as above, but the venation is less broad, and the only distinct black spots are some small linear ones on the outer margins of all the wings; on the secondaries is a faint pinkish streak parallel with outer margin, most clearly defined at anal angle. Expanse, 78—90 mm.

Four specimens (three males, one female), taken in May and June at Chang Yang.

Closely allied to *H. mena*, Moore, from N. India, but may be at once distinguished from that species by the pinkish streak on both surfaces of secondaries, a character which brings it very near to *H. assimilis*.

HESTINA VIRIDIS, sp. n.

♂. Pale greenish, neuration broadly black; outer third of primaries black, its limit not well defined internally, enclosing a transverse series of large spots followed by smaller ones; these are of the ground colour, and the two last of each series are linear. Secondaries have a marginal and submarginal series of ill-defined black spots; outer margin and fringes black, abdominal fold tinged with yellowish. Under surface whitish green; neuration and some dashes between the nervules black; outer margin and fringes black; secondaries have the costa beyond the subcostal nervure and abdominal fold yellow.

♀. Similar to the male, but the bar closing the discoidal cell of primaries is almost obliterated, the black of outer third is broken up into a double series of spots below apex, and the venation is less broad. Expanse, ♂ 96 mm., ♀ 110 mm.

Two specimens from Chang Yang (male June, female July).

Allied to *H. assimilis*, but at once distinguished by the total absence of red markings.

HESTINA OBERTHURI, sp. n.

Greyish white, venation broadly fuliginous; outer margins with broad fuliginous borders, that of primaries intersected by one and of secondaries by two transverse rows of small spots of ground colour. Under surface similar to above, but there is a bluish black line on all the wings parallel with outer margin. Fringes white, chequered with black. Expanse, 76 mm.

Several examples taken in June at Chang Yang, and September at Ichang.

In some specimens the pale ground colour is much suffused with fuliginous.

Unlike any species of *Hestina* with which I am acquainted.

EURIPUS JAPONICUS.

Euripus japonicus, Feld. Weiss. Ent Mon. vi. p. 27 (1862).

Var. *chinensis*.

One male specimen captured in August, at a place three days' journey N. of Ichang.

As this example differs from the Japanese form of the species in the much smaller size of the white spots and streaks on both

surfaces, and in having the basal spot, costal and inner marginal streaks of secondaries yellow instead of white, I have given it the varietal name of *chinensis*.

APATURA FASCIOLA, sp. n.

Dark fuscous brown. Primaries edged with yellowish along the costa to beyond the middle, and tinged with the same colour on outer margin; the central area is traversed by a yellow band composed of seven spots, of which the two nearest costa are smaller and the next pair larger than the other three; a white spot towards apex. Secondaries with a central transverse yellow band extending from costa to submedian nervure, and interrupted by the nervules; the outer margin is yellow, tinged with fuscous, and intersected by a transverse line of the ground colour, a black spot above anal angle. Under surface opalescent, clouded with tawny on the outer margin of all the wings; the primaries have a bluish-white spot near apex, below this are three small dots of the same colour and a black dot set in a tawny ring; secondaries with a well-defined ocellated spot near anal angle, and a series of small spots above; the basal half of all the wings is darker than the outer half, and separated by a tawny transverse line, most clearly defined on the secondaries. Expanse, ♂ 74 mm., ♀ 82 mm.

Two male specimens taken in July, and two females in August, at Chang Yang.

ATHYMA PUNCTATA, sp. n.

♂. Black. Primaries with apical and central white spots, shaded on edges with violet-grey; the former is intersected by the subcostal nervure, and the latter by the rays of the median. Secondaries with a large central white spot, shaded with violet as on primaries; broad submarginal line pale. Under surface rusty brown; primaries have white spots as above; a violet-grey longitudinal streak from the base, interrupted by the ground colour before reaching the centre of the wing where it terminates, is broadly bordered below and outwardly with blackish; there are indications of a violet-grey submarginal line; secondaries white along the costa, central white fascia extends from costa to the bluish-grey abdominal fold; submarginal band whitish, tinged with violet and bordered outwardly with a dark brownish shade. Expanse, 68 mm.

Two male specimens taken in May and July at Chang Yang.

ATHYMA DISJUNCTA, sp. n.

Fuliginous-black, with white markings. Discoidal streak of primaries terminating in a somewhat triangular head, and followed by an oblong transverse dash; beyond and nearer the costa are three other oblong spots; central band composed of eight spots, the sixth of which is round and larger than the others, but the fourth is very small or quite absent; submarginal series of linear spots only faintly indicated towards costa, followed by black quadrate spots. Secondaries with central and submarginal bands, the latter composed of linear spots, slightly decreasing in size towards costa; between the bands and also before outer margin are some black quadrate spots. Under surface of primaries blackish, marked with tawny along the nerves; basal and central spots as above, but the fourth spot of the latter series more clearly defined; marginal series large, those nearest the costa nearly obliterated, and the others intersected by a tawny transverse band; secondaries tawny, with a black-edged white streak from the middle of the base to the costa, followed by some black dots; central band bordered with blackish, interrupted, and extending only to the abdominal fold; submarginal

band as above, but the inner edges of the spots are rounded and bordered with blackish; between these bands is a series of conspicuous short longitudinal black dashes, the lower ones edged externally with white; a fairly broad blackish band on outer margin, preceded by an interrupted white one. Expanse, ♂ 68 mm., ♀ 76 mm.

The bands on upper surface are very like those of *A. sulphitia*, but the form of the discoidal streak on primaries is very similar to that of *A. helmanni*.

I have received a splendid series of this novelty from Chang Yang, taken in June and July.

ATHYMA FORTUNA.

Athyma fortuna, Leech, Trans. Ent. Soc. 1889, p. 107, pl. viii. figs. 1, 1a.

A nice series from Chang Yang, June and July.

In some of the male specimens the white spots forming the central band of all the wings exhibit a tendency to elongation, as in *L. sydyi*, Ld., var. *latefasciata*, Mén. (Schr. Reis. p. 29). I propose that this form should be known as var. *diffusa*.

LIMENITIS PRATTI, sp. n.

Black, inclining to brown towards base of all the wings. Primaries with a white transverse bar, preceded and followed by obscure whitish ones in discoidal cell; a central series of six quadrate white spots and beyond a transverse series of smaller red spots, the upper of which are round, and the two nearest costa edged internally with white; submarginal spots white, intersected by a line of the ground colour, that in the second median interspace large and triangular. Secondaries have two black transverse bars enclosing an obscure red one near base; a central series of seven white spots, followed by a series of smaller red ones; outer margin broadly bordered with white, intersected by an interrupted transverse band. Under surface similar to above, but the costa is whitish and the markings are larger, those in the discoidal cell are well-defined, and below the cell there is a large white blotch, transversely intersected by a blackish band; secondaries have the costa edged with red, and there are some reddish and black marks on the white basal third; the other markings same as above, but more band-like in character. Expanse, 69 mm.

One example taken in July at Chang Yang.

This species is more nearly allied to *L. populi* than any other *Limenitis* known to me.

NEPTIS HESIONE, sp. n.

♂. Fuliginous-black, with pale buff markings. Discal streak of primaries broad, partially suffused with blackish, the outer extremity produced and obtusely pointed, two spots near apex, oval and of nearly equal size, separated from each other by the first discoidal nervule, and from an indistinct curved linear spot by the subcostal nerve; a spot in the first median interspace is nearly round and touches both nervules, below are two smaller spots separated by the submedian; submarginal pale and narrow. Secondaries have a fairly broad central band; submarginal band, bordered externally with blackish grey, tapers from costa, attains its greatest width in the submedian interspace, and from thence is attenuated to abdominal margin; between the bands is a transverse series of oblong black spots.

Under surface chocolate-brown; markings white, streaked with ochreous-grey, and clouded with whitish along the costa; discal streak broad, clear and distinct, with a large blackish patch below; apical spots hardly separated; spot in first median interspace invades the space above and unites below with the enlarged pair on inner margin; submarginal line white tinged with violet, interrupted towards apex by two longitudinal streaks of the ground colour, and preceded by a chocolate-brown band, which is narrowly edged inwardly with blackish grey, and intersected by a transverse series of pale lunules: secondaries with basal, central, and submarginal bands; the first traverses the wing from base to costal nerve, where it is cut into by the ground colour; the second is bordered externally with blackish grey, followed by ochreous-grey; the third is tinged with violet, preceded by an interrupted band of the ground colour, bordered with ochreous-grey, and followed by a series of lunules, also of the ground colour, edged externally with whitish. Fringes chequered black and white. Expanse, 56 mm.

One male specimen taken in July at Chang Yang.

Closely allied to *N. arandia*, Oberth., but differs from that species on the upper surface in the broader discal streak, closer proximity of the apical spots, and pale submarginal band of primaries; also in the broader central and uninterrupted submarginal bands of secondaries, whilst beneath there are several points of difference.

NEPTIS THISBE.

Neptis thisbe, Mén. Bull. Acad. Pet. xvii. p. 214 (1859); Schrenck's Reisen, ii. p. 26, t. 2, fig. 9 (1859); Elwes, Proc. Zool. Soc. 1881, p. 894.

An extensive and somewhat variable series from Chang Yang, where the species appears to be on the wing from June to August.

Var. *themis*.—Fringes of primaries almost wholly white at the apex, and black from the fifth subcostal nervule to below first discoidal nervule; there is no trace of fulvous on the outer margin of secondaries. On the under surface of primaries the spot between discoidal nervules is large, round, and without a trace of marking below it in next interspace; the central band of secondaries terminates in a large white spot between the subcostal nervules, and there are no markings in the interspace above or between the band and discal streak, which in this form is distinctly white.

Three examples (two males, one female).

Var. *thetis*.—Identical with var. *themis* above, but beneath there is a white mark in interspace below the outer round spot of primaries; the discal streak and submarginal band of secondaries are merely fragmentary; the basal and terminal portions of the former only remain, and of the latter there are some traces towards outer angle. There is also a noticeable absence of brown clouding on secondaries, and the brown band posterior to the white central one is very narrow.

Four examples (three males, one female).

There are intermediates between each of these forms and the type.

NEPTIS ANTILOPE, sp. n.

Black, with a slight brownish tinge; markings yellow. Discal streak of primaries obtusely pointed, two oblong spots and a dot above towards apex,

an oval spot below intersected by second median nervule, and a wedge-shaped one on inner margin interrupted by the submedian nervure; submarginal band pale and narrow. Secondaries have central and submarginal bands; the former is somewhat narrow, and the latter tapers towards either extremity. Under surface of primaries chocolate-brown, a broad patch of yellowish occupies the space between costa and median nervure, absorbing the paler discal streak; the outer limit of this patch is marked by some whitish spots, and the upper portion of black suffused patch, which lies between median nervure and inner margin, extends to the narrow reddish brown submarginal band, and encloses a large yellowish white spot; outer margin has a broad yellowish border, intersected by one paler and one darker indistinct lines; the apical portion of the border extends inwards and amalgamates with the two oblong spots; secondaries yellowish; central band white, edged externally with blackish grey, and followed by a chocolate-brown wavy band, the upper portion of which is broadly bordered with violet-grey; submarginal band light chestnut. Fringes white, with black patches at tips of nervules. Expanse, ♂ 58—67 mm., ♀ 67 mm.

Two male specimens taken in June, and one female example in July at Chang Yang. I took two specimens at Hong Kong in March, 1886; these are smaller than those from Central China.

This species superficially resembles *N. thisbe*.

NEPTIS CYDIPPE, sp. n.

Similar in size and shape to *N. thisbe*; the markings, however, are very like those of *N. antilope* on the upper surface, but there are three pale spots from middle of costa of primaries, and the costal spot of apical trio is much larger. Under surface of primaries chocolate-brown, suffused with pale ochreous between costa and discal streak; outer margin broadly bordered with same colour, intersected by a narrow interrupted chocolate-brown band; inner margin to median and first branch dark grey, a blackish patch above in first median interspace; some violet-tinted whitish spots from costa to outer end of discal streak; apical spots whitish, as also are those in the median interspaces, but the outer edges of these last are more or less encroached upon by the marginal border. Secondaries pale ochreous tinged with brownish, and clouded with chocolate-brown on outer portion of costa; some violet-grey and chocolate-brown marks between the costal and second subcostal veins; central band whitish, bordered externally by a suffused chocolate-brown band, the outer edge of which is irregular; beyond are some chocolate-brown spots, followed by a pale transverse band and some obscure brown spots. Expanse, ♂ 70—77 mm., ♀ 84 mm.

Several specimens of each sex taken in July and August at Chang Yang.

NEPTIS BEROE, sp. n.

♂. Brownish black, with yellow markings. Primaries have a broad discal streak interrupted by the third median branch, and continued downwards as a curved spot, which is interrupted by the second median branch and terminates at the first, below is a somewhat triangular patch intersected by the submedian nervure; towards the apex are two large oblong spots, separated by the subcostal nervure from a long streak on the costa. Secondaries have broad central and narrower submarginal bands; the costa is broadly glassy. Under surface pale fulvous, outer margins of all the wings paler; primaries have curved discal streak and spots on inner margin as above, but whitish in colour, the lower spots of the two towards apex is obscured by a greyish suffusion, and the same colour replaces the linear yellow patch on costa; between these spots and two indistinct ones just below middle of costa is a bright chestnut-brown cloud, the narrow

submarginal band terminating in a dark grey cloud on inner margin is of the same colour, and is bordered externally with paler whitish; secondaries tinged with greenish between costal and second subcostal nervule to beyond the middle, where there is a small bright chestnut-brown cloud; the white central band is suffused with greyish at its outer extremity, and has a clouded brownish edging; submarginal band whitish, with a violet tinge, interrupted by the nervules, bordered on each side with dark grey, and preceded by a bright chestnut-brown band tapering from the outer angle to inner margin. Fringes white-chequered, except at fourth subcostal, with black patches at the extremities of the nervules.

♀. Darker; streak and bands narrower, spots rather smaller, the patch on costa of primaries represented by a small linear spot and some yellow scales; the costal border of secondaries is not glassy. The under surface is more suffused with bright chestnut-brown, the space enclosed by curved discal streak is black, slightly glossy towards base. Expanse: male, 68 mm.; female, 70 mm.

Two males and one female, Chang Yang, taken in June.

NEPTIS ASPASIA, sp. n.

Black, tinged with brown; markings yellow. Discal streak of primaries interrupted at the fork by the third median branch, the continuation has its external edge gently curved, and below its extremity is a nearly round spot in the first median interspace. Secondaries broadly cinereous along costal third; central band, which is white on the abdominal fold, runs straight towards outer margin, but is interrupted by the costal border; submarginal band tapers from outer angle, the upper portion obscured by costal border. Under surface chestnut-brown, inner portion of primaries below discal streak and curved extension leaden grey; some violet-grey spots from middle of costa, a large white spot below submedian, and a violet-grey dash above, together with an ill-defined pale violet spot in discoidal interspace are edged externally by an undulated transverse dusky line; parallel with the outer margin is an interrupted pale violet line: secondaries, white central band bordered on each side with blackish grey, curves upwards from second subcostal nervule in the direction of outer angle, and is followed by two wavy narrow greyish bands, each bordered with darker; submarginal band pale violet, bordered with greyish, tapering from outer angle; an indistinct grey line parallel with outer margin. Fringes white, with patches of black at tips of nervules, preceded on the under surface by a broad dark line. Palpi pale grey, with dense black hairs. Eyes plum colour. Expanse, 80 mm.

One example from Chang Yang, taken in July.

NEPTIS ANTIGONE, sp. n.

Very similar to *N. aspasia* on the upper surface, but the spot in first median interspace forming continuation of discal streak is larger, rounder, and more completely isolated, whilst the costal band of secondaries is broader, and traverses the wing from abdominal margin, where it is but slightly paler, to middle of subcostal nervure, the submarginal band is also much broader, and commences below the subcostal nervure. Under surface dark ochreous brown, the discal streak proper and a portion of the extension are much suffused with this colour, the spot below in first median interspace is fairly distinct, and only separated by the first median nervule from a white dash extending to inner margin, the enclosed space is black; a curved series of four blue-tinted white spots from middle of costa and a large white one beyond; an obscure brown narrow band commences on the costa, skirts the external edge of white spot, and then turns outwards and downwards parallel with outer margin, terminating in a black cloud on inner margin; secondaries paler towards base; central band tinged with violet and

bifurcated towards costa, followed by a broad bluish grey line; submarginal band white tinged with violet, and intersected by a transverse line of the ground colour; there are some indications of a line parallel with outer margin. Palpi white, with black hairs; eyes brown. Expanse, 78 mm.

One example, Ichang, May.

NEPTIS ARACHNE, sp. n.

Resembles *N. beroe* and also *N. aspasia*, in the markings of upper surface, but it lacks the central streak of the former, and the apical spots are more clearly separated in the latter, whilst it differs from both in the rupture of discal streak from its continuation at second median fork. In this species the disconnection is effected, not only by the passage of the third median nervule, but by the interposition of a triangular patch of the ground colour in the fork. Under surface bright chestnut-brown. Primaries ochreous at base and along costal fold, a bluish grey discoidal spot, some ochreous scales at the commencement of the discoidal nervules and a suffused ochreous mark to discal streak below; beyond is a curved series of four large bluish grey spots, and nearer the apex a pale ochreous spot, above which are some ochreous streaks; dentated submarginal line ochreous, narrowly edged internally with ground colour, preceded by some ochreous suffused patches, and bordered externally by a band of the ground colour; outer margin broadly ochreous, intersected by a transverse interrupted line of the ground colour; discal streak and curved continuation pale ochreous, enclosed space blackish grey, which colour is continued below the first median nervule to border of outer margin; secondaries ochreous, basal half of costa tinged with chestnut; a broad suffused patch of bright chestnut-brown from outer half of costa to discoidal nervule, and from thence continued as a narrow band to abdominal margin, the patch encloses some bluish grey marks and there are some chestnut spots towards base; broad central band pale ochreous, suffused with dark grey beyond the third median and bordered externally with bright chestnut-brown, this is followed after an interval by a narrow transverse band of the same colour, as also is the sinuous submarginal line. Fringes white, with black patches at extremities of nervules, that at fourth subcostal is small whilst those of second and third median nervules approximate, leaving a very slender space of white. Expanse, 77 mm.

One male example taken in July at Chang Yang.

IOLAUS LUCULENTUS, sp. n.

♂. Light blue, finely dusted with black scales; costa and outer margin of primaries to below third median nervule broadly black. Secondaries with two white-tipped black tails; costa bordered with black, abdominal margin broadly whitish; two black spots on outer margin towards the black anal angle, which has an orange-brown lunule; fringes white, chequered with black at extremities of nervules and preceded by a black line. Under surface pale greyish white; primaries have linear discoidal spot and central transverse lines blackish; submarginal line dusky; secondaries have a blackish discoidal bar and transverse wavy central lines; there are also two blackish linear spots, one near base and towards costa, the other about the middle of inner margin; submarginal line dusky; a black spot at anal angle, and one between second and third median nervules, the first narrowly, and the last broadly bordered with reddish orange.

♀. Paler; black border of primaries narrower over cell, disclosing a distinct black discoidal spot, beyond which is a whitish cloud. Expanse, ♂ 40 mm., ♀ 44 mm.

Four male and three female specimens taken in July at Chang Yang.

Allied to *Iolaus longinus*, Hew.

IOLAUS CONTRACTUS, sp. n.

♂. Black, ornamented with bright dark blue, which on the primaries forms a patch extending from the base to the middle of the disc between the median and submedian nerves, slightly encroaching beyond each boundary. On the secondaries the blue forms a broad oblique abbreviated band, its anterior limit being the second subcostal nervule, and its posterior the first median, but there is a small triangular mark beyond this latter boundary, extending to the orange spot at anal angle; there are some black spots towards the outer edge of the blue band; the abdominal margin is paler, becoming whitish at the base. There are two tails of equal length, both black with white tips. Under surface of primaries whitish grey; discoidal spot linear white; central transverse line blackish, terminating at the submedian nervule; submarginal line indistinct; on the middle of inner margin is a fan-like arrangement of long dark grey hairs; central transverse line of secondaries wavy, turning off at a right angle to abdominal margin when opposite anal angle; outer margin bordered with dark grey, intersected by a band of ground colour; a large black spot on the outer edge of a round orange patch before the first tail, and one at angle preceded by an orange streak.

♀. Greyish black, with a patch of pale lilac-blue on the disc of primaries, and some scales of the same colour towards outer margin of secondaries; fringes grey. On the under surface the lines are more distinct, and the spots larger. In one female specimen the lilac-blue is only shown on the primaries as a discal suffusion. Expanse, ♂ 38 mm., ♀ 40–42 mm.

Allied to *I. iapyx*, Hew.

THECLA ELWESI, sp. n.

♂. Fuscous brown, the discal area of primaries tinged with reddish orange, especially behind the black bar which closes the discoidal cell. Secondaries with some black spots and orange marks on outer margin at anal angle; tail reddish orange, edged with black and tipped with white. Under surface sandy brown, dusky discoidal bar edged with white, followed by an oblique triangular streak darker than the ground colour and bordered on each side by a white-edged dark line; a dusky line, edged externally with paler parallel with outer margin; secondaries with two white central transverse lines, the first edged externally with dusky and not extending beyond the median nerve, the second slightly wavy, bordered internally with dusky, and curved inwards beyond the second median nervule; outer margin bordered with reddish orange, edged internally with pale ochreous, wider towards anal angle, the orange colour extending halfway along the abdominal margin; a black spot at anal angle and one in the second median interspace; fringes white, preceded by a black line which traverses the tail to the white tip.

♀. Orange-brown, clouded with greyish brown towards the base of all the wings, apex and outer margin black; a black spot on secondaries in second median interspace; fringes whitish, grey at the base and extremities of nervules. Under surface of primaries reddish orange, secondaries rather browner; markings as in the male, except that the first transverse line of secondaries extends farther across the wing. Expanse 50 mm.

One female taken in July, and two males captured in August, at Chang Yang. Also two female specimens taken in the latter month, at Ichang; these have the basal half of all the wings suffused with greyish brown, and the marginal border of primaries is broader.

The male bears a superficial resemblance to the same sex of *T. betulæ* from Europe, but it is much larger and the tails are longer and more slender.

THECLA ORNATA, sp. n.

♂. Primaries blackish, with a large reddish-orange patch on the disc, intersected by the second and third median nervules; fringes dark grey. Secondaries fuliginous brown, with a short tail at the extremity of the second, and a much longer one at the extremity of the third median nervule; both are black, tipped with white; fringes white, tipped with black and preceded by a black line which towards anal angle is edged internally with whitish. Under surface olivaceous grey; central transverse line of primaries white-edged internally with black; submarginal series of black spots bordered with white and increasing in size towards inner margin: secondaries have a white central line inwardly edged with black, and uniting in the second median interspace with a submarginal line composed of white-edged black spots, and followed by a reddish-orange patch, which is widest between the second and third median nervules, and hardly to be traced beyond the first median branch; from the abdominal margin, above the orange patch, are two short black-edged oblique lines, approximating at their discal extremities; between the termination of these lines and the juncture of central and submarginal lines is a black-edged white curve; a black spot at anal angle, between which, and one in the second median interspace is a pale blue patch edged internally with black; fringes of all the wings olivaceous grey, preceded by a dark line, which is edged internally with white, especially on the secondaries.

♀. Fuliginous brown, without reddish-orange patch. Under surface as in the male. Expanse, ♂ 32-34 mm., ♀ 35 mm.

Two male and one female specimens taken in July at Chang Yang.

Allied to *T. v-album*, Oberth. Etud. d'Ent. xi. pl. iv. fig. 23, but the reddish-orange patch on upper surface of primaries is more in the centre of wing, and the markings of under surface are of a very different character.

THECLA RUBICUNDULA, sp. n.

♂. Fuliginous-brown. Primaries with a discal reddish orange suffusion. The tail of secondaries hardly darker, narrowly tipped with white; fringes grey. Under surface brown; outer margin of primaries broadly tinged with reddish orange; central transverse line white, bordered internally with dark brownish; there are some indications of a submarginal series of black dots; central transverse line of secondaries white, bordered internally with dark brownish, and bidentated before reaching the abdominal margin; outer margin broadly bordered with reddish orange, and preceded by a submarginal series of small black spots, edged internally with bluish; a black spot at anal angle, and one in the second median interspace; between these is a faintly blue triangular spot. Expanse, 31 mm.

Two male specimens, Chang Yang; June.

Allied to *Thecla ornata*, but the primaries are paler and the reddish orange colour does not form a distinct patch; on the under surface the red markings at once separate it both from *T. ornata* and *T. v-album*.

DIPSAS MINERVA, sp. n.

♀. Pale orange-brown; outer margin of primaries narrowly bordered with black, broader at the apex. Secondaries with a black spot on outer margin between second and third median nervules, and another at anal angle; fringes grey, darker at the tips and extremities of nervules, preceded

by a black line, which traverses the tail to the white tip. Under surface rather paler than above; primaries with an interrupted white submarginal line, edged internally with black, followed by a series of white lunules, edged externally with black, and enclosing reddish orange spots; secondaries have a white submarginal line, edged internally with black, with three deep indentations before abdominal margin, followed by an undulated black-edged white line enclosing some reddish orange spots and two black ones; one of these last is placed at outer angle, and the other, which is edged with reddish orange, between second and third nervules; the orange spots are edged externally with black, intersected by short projections from a white line parallel with outer margin; fringes and tail as above. Expanse, 37 mm.

In one of the specimens the border of outer margin and apex is very faintly indicated.

Five female specimens taken at Ichang in June.

Allied to *Dipsas* (*Thecla*) *seraphim*, Oberth. Etud. d'Ent. xi. pt. 5, fig. 37, from which it differs principally in the arrangement of markings on under surface of secondaries.

DIPSAS COMES, sp. n.

♀. Closely allied to *D. minerva*, but the black border of primaries is confined to the apical and costal areas; on the secondaries there is no black spot, but there are traces of a pale submarginal line, which is deeply indented before abdominal margin; the under surface is browner, there are no markings on the primaries beyond the submarginal line; the submarginal line of secondaries starts from a point nearer the middle of costa, has only one deep indentation before abdominal margin, the line following extends only from the outer angle to second median nervule and forms a series of arches interrupting the broad reddish orange marginal border; there is no black spot at outer angle, and that between the second and third median nervules is smaller. Expanse, 38 mm.

One female example taken in July at Chang Yang.

DIPSAS MELPOMENE, sp. n.

Pale orange-brown; apex of primaries, tail, and anal angle of secondaries black. Under surface rather browner than above; primaries streaked with whitish along the inner margin, discoidal bar and submarginal line darker, the latter faintly edged externally with whitish; secondaries with dark discoidal bar edged with whitish; submarginal line white, curved, and slightly indented before abdominal margin, followed by a paler shade of the ground colour; a spot between second and third median nervules and one at anal angle black; the marginal border is of the ground colour, intersected by a paler line to the second median nervule, then pale reddish orange to the abdominal margin; fringes of the ground colour, preceded by a darker line to the second median nervule, from which point to the anal angle the fringes are white, preceded by a black line, which traverses the tail to the white tip. Expanse, 40 mm.

One example captured at Chang Yang in August.

Allied to *T. jonasi*, Janson, but easily distinguished therefrom by the different character of the apical patch of primaries above and the markings on the under surface of secondaries; the tails are longer and more slender.

DIPSAS THESPIS, sp. n.

Pale orange-brown; tail, anal angle, and spot between second and third median nervules black. Under surface pale ochreous-brown, with central transverse and submarginal lines of primaries white, the first bordered internally and the last externally with black; secondaries have an internally black-bordered white central line projecting sharply outwards before reaching the abdominal margin, and a submarginal series of connected black-edged white lunules, the first of which at the outer angle is followed by a black spot; another larger black spot displaces the lunule between second and third median branches; this is surrounded with reddish orange, and the marginal border is tinged with the same colour; a small black spot at anal angle, and there are some short longitudinal black dashes before the black line at base of the white fringes. Expanse, 33 mm.

One example, taken at Ichang in August.

Allied to *Dipsas* (*Thecla*) *lutea*, Brem., but differs from that species very materially in the markings of under surface of secondaries.

RAPALA REPERCUSSA, sp. n.

♂. Fuliginous-brown, with strong purple reflections; fringes slightly paler; tail of secondaries black, tipped with white; lobe at anal angle marked with blue and pale orange. Under surface olivaceous-brown; primaries have a faint pale linear discoidal spot and central transverse line, the latter with an interior edging of fuscous; submarginal line indicated only towards inner margin: secondaries have a dark discoidal bar outlined with white; a waved white line broadly bordered anteriorly with fuscous, and preceded by a thin wavy white line, forming a compound band extending only to the submedian nervure, is intersected by the nervules, and exhibits a tendency to become broken up into spots; at its termination are two short parallel white lines running to abdominal margin; submarginal line whitish wavy; a large velvety black spot encircled with orange in the second median interspace; the lobe at anal angle is black, with white fringe, above it is a blue spot, and two small patches, one orange and the other blue separated by a black streak; fringes of abdominal margin white. Expanse, 40 mm.

♀. Rather browner, and the purple reflection is less intense.

Ten males, two females, Chang Yang; July.

Allied to *Rapala* (*Deudorix*) *manea*, Hew. Ill. D. L. p. 23, pl. 9, figs. 40, 41 (1863).

In some examples of the male there is a distinct reddish orange cloud just beyond the discoidal cell on primaries; this is faintly indicated in other males and one female specimen.

RAPALA SUBPURPUREA, sp. n.

♂. Closely allied to *R. reperculsa*, but the purple reflection is more vivid, and on the primaries almost confined to the lower half of the wing; the lobe at anal angle of secondaries is black, with white fringes tipped with black. On the under surface the primaries are greyer on the inner margin; the discoidal spot is outlined indistinctly; the transverse line is dark olive-brown, edged externally with whitish, and more obliquely placed; submarginal line pale. The central transverse line of secondaries is dark olive-brown, edged externally with whitish, and internally, towards abdominal margin, where it forms a distinct W, with tawny; submarginal line dusky; the black spot in second median interspace has an inner border of reddish

orange, between this and black anal lobe is a dark patch powdered with whitish scales. Abdomen below yellowish. Expanse, 38 mm.

♀. The primaries are rather more uniformly suffused with purple.

Nine males, three females; Chang Yang, June and July; Ichang, July.

LYCÆNA ARCANA, sp. n.

♂. Brown; secondaries with a slender short black tail fringed with white; discoidal spot of primaries black; discal area suffused with pale blue, as also is the basal area of secondaries, which is further adorned with a submarginal row of black spots, the last two bordered internally with orange, and externally with whitish. Under surface pale grey; discoidal spot, central, and submarginal lines of primaries dark grey, bordered with white. The secondaries have three black basal spots; discoidal spot and central line dark grey, bordered with white; the line is much interrupted, especially towards the costa, and is represented on the costa itself by a black spot outlined with white; submarginal line wavy dark grey, and preceding a series of triangular spots of the same colour on the outer margin; two black spots towards anal angle, edged outwardly with metallic-blue and inwardly with orange.

♀. Similar to male, but without the blue suffusion. Expanse, ♂ 31 mm., ♀ 33 mm.

One male, Chang Yang, June; one female, Ship-y-Shan, September.

Allied to *L. argiades*, but differs therefrom in the ornamentation of under surface.

LYCÆNA NEBULOSA, sp. n.

♂. Lilac-blue, suffused with fuscous. Primaries have some pale blue scales along the costa, and a distinct black discoidal spot; the outer margin is broadly bordered with black, and the central series of spots of the under surface are faintly indicated. Secondaries have all the margins broadly bordered with black. Fringes white. Under surface pale greyish white; linear discoidal spot and central series of spots on primaries black; submarginal series of dark grey lunules, followed by a series of blackish linear spots on the outer margin; secondaries have a basal series of three, and a central series of eight, black spots; discoidal spot is linear and very narrow, the markings beyond are similar to those on primaries, but the spots on the margin in the median interspaces are round and larger; fringes white, streaked with grey, and preceded by a thin blackish line. Expanse, 36 mm.

One male specimen taken in June at Chang Yang.

Somewhat resembles the female of *L. argiolus*, but differs therefrom in the shape of primaries, shade of blue, and markings of under surface.

SATSUMA CHALYBEIA, sp. n.

♂. Pale blue; costa, apical third, and outer margin of primaries black, as also are the fringes; secondaries with an interrupted black submarginal band; a broad black line before the black and grey fringes. Under surface grey dusted with black atoms, basal half of primaries blackish, discoidal spot, central and submarginal wavy lines black; transverse band of secondaries occupying the central third of wing blackish limited by black wavy lines, submarginal line black, undulating, followed by some obscure dusky spots; fringes as above. Expanse, 30 mm.

One male example, Chang Yang, May.

Differs from *Satsuma Thecia firsaiaszkyi* Ld. in having two distinct transverse lines on upper surface of primaries, and in the absence of white markings on under surface of all the wings.

SATSUMA PLATEA Sj. L.

♂. Fuliginous-brown. Primaries have some fine scales below the median nervure, and the secondaries have a dull bluish reflection. Under surface of primaries brown, suffused with blackish towards the black basal area, an indistinct wavy dark central line bordered with white at costa; secondaries black irrorated with white scales, and a brown cloud towards outer angle, the indented central line broadly bordered with white below costa and at inner margin; submarginal band wavy ill-defined and interspersed by a pale wavy line. Expanse, 81 mm.

(One male specimen taken in June, at Ichang.)

Separable from *Satsuma Thecia firsaiaszkyi* by the darker colour of all the wings, and by the white markings and blackish ground colour of under surface of secondaries.

AMBLYPODIA ANGULATA Sp. n.

♀. Costa of primaries slightly sinuous, outer margin dentate and rather concave from apex to middle. Costa of secondaries convex near the base, then concave to the acuminate and vertical apex from whence the outer margin descends obliquely to the middle when it becomes rounded; tails are somewhat spatulate. Black with a strong suffusion of bluish purple, intersected by the black venation, on the disc of all the wings; discoidal spot of secondaries black and star-like. Under surface of primaries blackish, with a large quadrate pale grey blotch on the greyish inner margin, preceded by some short brownish grey transverse lines on the disc; central line brownish grey, curved and wavy; submarginal line darker, edged internally with black, twice angulated above inner margin, and followed by some indistinct dark grey-brown lunules; secondaries grey irrorated with black, suffused with violet towards the base and clouded with obscure purplish violet over the rest of the wing; several pale but ill-defined transverse lines. Expanse, 40 mm.

(One female example received from Chang Yang.)

Amblypodia ganessa, Moore, Cat. Lep. E. I. C. p. 44, pl. 1a, fig. 9 (1857). Var. *seminigra*.

♂. Primaries blue paler beyond cell, costa and outer margin deeply bordered with black; the discoidal spot, which is within the costal border, is more intensely black. Secondaries black suffused with blue most pronounced along the central area. Fringes fuscous grey. Under surface pale brownish grey with four whitish wavy edged darker bands, the first two are basal the third is abbreviated the fourth broad and the only one which is clearly defined; submarginal line slender and interrupted; secondaries greyish brown with four interrupted bands these are of the ground colour, but darker at the edges and bordered with whitish; brownish submarginal line wavy, bordered with whitish and followed by a few brownish linear dots on the margin; fringes pale grey preceded by a darker line. Expanse, 82 mm.

(One male example, Chang Yang, June.)

DODONA MACULOSA, sp. n.

♂. Black with fulvous and white markings. Primaries have an oblique central band represented by a bar in the discoidal cell and one below to the inner margin; beyond is a slender linear discoidal spot, followed by a larger

double spot intersected by the discoidal nervule; above is a small dot on the costa, and below are three roundish spots, those in the submedian and first median interspaces are out of line and nearer a submarginal series of spots, the last of which is linear and slightly curved, the next round, and the one above dot-like; the remainder of the series comprises two pairs of white spots, but the initial one of the costal pair is very small; there are two other white spots nearer the apex. On the secondaries the markings comprise an oblique streak from the costa to the submedian nervure, one beyond extending nearly to the anal angle, but interrupted by first pair of median branches; a short bar from the costa broken up by the venation into three spots; a submarginal band also interrupted; all, together with a line parallel with outer margin, are obscure fulvous; the anal lobe and tail are black, the former bordered with whitish. Fringes grey tipped with black. Under surface inclined to brown; all the markings of primaries are similar to above, but rather paler, less interrupted, and with the addition of a basal band and a marginal series of linear spots. Secondaries with a pale fulvous streak along abdominal margin, which unites before the anal angle with one running from the base parallel with submedian nervure, and enclosing a third broader streak; an oblique white streak from the costa terminates on the submedian nervure in a point, and beyond is a party-coloured streak, white at the costa, pale fulvous to the second median, and then white again to its termination; the whitish submarginal band is preceded by a black interrupted streak and followed by a black transverse dash from the costa; a broad pale fulvous line, white near costa, parallel with outer margin; anal lobe and tail velvety black edged and fringed with white, above is a whitish cloud.

♀. Similar to the male, but the markings are paler, much larger, and less interrupted. Expanse, ♂ 89 mm., ♀ 42–46 mm.

Two females, Chang Yang, June; four males, two females, Ichang, July.

Allied to *D. egeon*, Dbld., from N. India, but easily distinguished by the different characters of the markings. It is also very close to *D. eugenes*, Bates, and may possibly be only a local form of that species.

LEUCOPHASIA GIGANTEA, sp. n.

♂. White. Primaries with a large black spot on the second discoidal nervule, sometimes extending upwards to the first; a smaller one on the discocellular. Under surface of primaries with the black spots faintly reproduced. Secondaries have an angulated suffused band indicated by a blackish costal streak, and a curved mark between the discoidal and third median nervules; discoidal cell intersected by a longitudinal black bar; the venation is dark, especially on the secondaries and outer margin of primaries. Head black; collar yellow; thorax black dusted with white; pectus sprinkled with yellow; abdomen white.

♀. Under surface of secondaries and apex of primaries tinged with yellowish, the black markings more band-like, with the addition of a ziczac black submarginal line; all these markings are faintly seen through from above. Expanse, ♂ 48–62 mm., ♀ 72 mm.

The specimens of the May brood are without black spot on primaries, the colour is more creamy, and the venation appears more prominent. I propose the name of *immacula* for this seasonal form.

The type is separated from the other species of *Leucophasia* by the large black spot on primaries, and both forms are distinguished by the yellow collar.

A fine series taken at Chang Yang in May and August.

PIERIS OBERTHURI, sp. n.

♂. White. Primaries: costa bordered with black; nervules edged on each side with black, expanding towards the outer margin, which appears in consequence to be deeply bordered. Secondaries black at outer angle and half-way along the costa; nervules bordered with black, and there are streaks of the same colour in the interspaces, pointed towards outer margin and bifurcated at their inner end. Under surface similar to above, but the streaks in interspaces of secondaries are connected with the borders of nervules; a deep yellow patch at base of secondaries.

♀. The black borders of nervules of primaries are not quite so broad as in the male, but otherwise there is no difference in the markings of the sexes. Expanse, ♂ 80 mm., ♀ 92 mm.

In one specimen the whole of the primaries is black with the exception of the discoidal cell, a broad patch from the base between the median nerve and inner margin, intersected by the submedian and a curved series of five oblong spots beyond the middle of the wing.

A fine series taken in April and June, at Chang Yang.

Allied to *P. acraea*, Oberth., but differing therefrom in the character of the marginal borders.

DELIAS PATRUA, sp. n.

♂. Black. Costa, inner angle, discoidal cell, and nervular interspaces streaked with grey, the streaks in latter are attenuated towards outer margins, before which they unite with a whitish-centred grey spot, those nearest apex are linear, and the streaks preceding are not always well defined. Secondaries, inner area of the wings within submedian nervure, and a portion of interspace above canary-yellow, each interspace above has a grey streak, those between the median nervules are centred with white, and the upper one is only separated from a broad discal streak by the disco-cellular nervule; a series of grey spots before the outer margin, those nearest anal angle with yellow linear centres. Under surface black; primaries with the streaks and spots as above but white, the costa is only sprinkled with grey scales, there are two short yellow dashes between costa and submedian nervure towards apex, and the spots nearest apex are more or less yellow: secondaries have canary-yellow markings, a broad patch at the base intersected by the præcostal, a broad streak, whitish towards base, in the discoidal cell; inner area as above; a central and submarginal series of spots, but the former are only suffused with yellow to a greater or lesser extent. Fringes grey and black.

♀. Fuliginous-black, the costa less grey, the streaks are shorter and are not connected with the spots towards outer margin; the inner area above is whitish towards abdominal fold. Expanse, ♂ 88 mm., ♀ 92 mm.

A fine series, Chang Yang, June.

Closely allied to *D. belladonna*, but at once separated by the absence of yellow patch at base of secondaries.

PTEROGOSPIDEA DIVERSA, sp. n.

Brownish black. Primaries have three subhyaline spots on the disc, and five very small ones towards apex, the central spots form a triangle, a lunar or linear one at end of discoidal cell, one rather larger and more quadrate beyond, and a still larger one below, of the outer five the second is punctiform and placed inwards, the fourth rather outwards, and the remaining two are directly under the first; a white spot in the submedian interspace under the larger subhyaline one. Secondaries have a broad white central band

terminating on the inner margin opposite a white band on the abdomen, and there are some black spots on its upper external edge. Fringes of primaries black, spotted with white above inner angle; of secondaries white, tinged with grey, becoming darker towards outer angle, and with a slender blackish line at their base preceded by some white spots. Under surface as above, but the white spot in submedian interspace is rather larger, and is followed by a whitish shade: the central band of secondaries is also wider, and encloses two black spots, there is a faint indication of a pale submarginal line; there are some bluish grey hairs at the base. Head and thorax tinged with yellow. Palpi yellowish, and the pectus is tinged with same colour.

A nice series from Chang Yang, taken in June.

Nearly allied to *P. sinica*, Feld., but easily distinguished therefrom by the different maculation.

PLESIONEURA GRANDIS, sp. n.

♂. Fuliginous brown, all the wings paler towards base. Primaries with a greyish apical patch and three subhyaline spots, one in the discoidal cell, a larger one below and a little beyond in the first median interspace, and a smaller one in the interspace above; fringes pale grey, becoming darker towards apex of primaries. Under surface of primaries greyish, costal half suffused with fuliginous from the base to just beyond the subhyaline spots: secondaries fuliginous brown, sprinkled with ochreous scales; fringes as above.

♀. Similar in colour to the male, but without the greyish apical patch on primaries; the subhyaline spots are larger, the two central ones are only separated by the median nerve. Expanse, ♂ 55 mm., ♀ 68 mm.

Two male specimens taken at Chang Yang, in April, and one example of each sex from Ship-y-Shan, captured in September; these have elongated primaries, whilst those from Chang Yang have broader secondaries.

PAMPHILA VIRGATA, sp. n.

♂. Dark brown. Primaries have a fulvous streak from base parallel with costa to beyond the middle, this streak is broken up by the subcostal nervules into linear spots, its outer extremity curving downwards, and terminate directly over four fulvous spots placed in the median and submedian interspaces, there are two more or less confluent yellow dashes in the discoidal cell, and the base and inner margin are streaked with fulvous scales. Secondaries tinged with fulvous towards base with some fulvous-centred dashes. Fringes yellow, chequered with dark brown. Under surface of primaries blackish, with centre spots as above, but the costal streak and discoidal spots are not so clearly defined, the apical half of outer margin is suffused with yellow, but the base is not sprinkled with yellow scales. Secondaries yellow, with some spots at the base, an indistinct central band, and two parallel transverse series of black spots before the outer margin, black, more or less obscured with yellow; the abdominal fold is streaked with blackish.

♀. Similar in ground colour to the male, but the yellow costal streak is ill defined, except above the one discoidal spot, the central spots are smaller, and all are pale in colour. Expanse, 30—32 mm.

A fine series from Chang Yang and Ichang, taken in June and July. I took examples of each sex at Foochau in April, 1886.

Allied to *P. maro*, Fab.

PAMPHILA MAGA, sp. n.

♂. Superficially resembles *P. virgata*, but the thorax is much stouter, and the primaries are without the yellow costal streak of that species, there are two yellow spots in discoidal cell, the lower of which is oblong and much the largest; beyond are six other yellow spots forming a transverse series, three of these are close together near the costa, one in each median interspace, and one near the submedian nervure. Secondaries have one spot in each median interspace. Under surface of primaries blackish; costa and upper portion of outer margin broadly suffused with yellow; the yellow spots of the upper surface are, with the exception of the sixth, reproduced, the second to fourth each followed by a black spot, and there is a submarginal series of indistinct black spots between apex and first median nervure; a projection from the yellow marginal border passes between the costal and central spots. Expanse, 82 mm.

One male example taken at Ichang in June, and I captured one at Ningpo in April, 1886.

PAMPHILA SIMILIS, sp. n.

♂. Exactly identical with the same sex of *P. prominens*, Moore, except as regards the sexual mark, which in this species is replaced by two subhyaline spots, one fairly large and triangular, the other, just above it, smaller and comma-like.

One male example taken at Chang Yang, in June.

HALPE SUBMACULA, sp. n.

♂. Dark brown. Primaries have a double subhyaline spot in discoidal cell, one in each median interspace beyond, and three forming a short oblique dash just below costa and near apex; there are also two small obscure yellowish spots below the discoidal cell. Secondaries have three central subhyaline spots, two of these are only separated by the second median nervure, and the third is nearer the costa. Under surface dark brown, clouded with yellowish, discal central and costal subhyaline spots as above, but tinged with yellow; the costa is streaked with ochreous to the middle, and there is a submarginal series of ochreous spots extending to first median; secondaries are brown, sprinkled with ochreous scales, with a pale yellowish spot near base of costal nerve, another nearer its middle, and one at its external extremity, the last constitutes the initial spot of a submarginal series of double pale yellow spots, the third of which represents the terminal spot of three, forming a longitudinal streak from the base of the wing; another longitudinal streak below is in connection with the last spot of submarginal series, but its junction therewith is obscured by some blackish markings; fringes of both surfaces pale yellow, chequered with blackish. Expanse, 38—40 mm.

Five male specimens from Chang Yang, taken in June.

CYCLOPIDES CHINENSIS, sp. n.

Brownish black. Primaries with a short white dash near costa and towards apex, broken up by the nervules into three spots. Under surface of primaries brown, suffused with fuliginous over the discal area, upper half of outer margins bordered with greyish, white dash as above; secondaries brown, inner half thickly sprinkled with greyish scales, and traversed by two obscure darker bands. Fringes dark grey, both above and beneath. Expanse, ♂ 32—34 mm., ♀ 36—40 mm.

Several specimens of both sexes, taken in the neighbourhood

of Ichang in June and August; and one male example, captured in June at Chang Yang.

The white spots forming the costal dash vary in number from three to one; in some specimens, where three are present, they are very faint; and in others all the spots are entirely absent from both surfaces.

Allied to *C. ornatus*, Brem., but separable therefrom by the absence of the silver streak on under surface of secondaries.

CYCLOPIDES NANUS, sp. n.

Fuliginous brown. Primaries have six small yellowish spots, one discoidal, and a transverse series of five beyond, two of which occupy the median interspace, and three near costa. Fringes of secondaries and towards inner margin of primaries whitish, spotted with brownish. Under surface of primaries as above, with the addition of a broad stripe of yellowish scales along the costa, and some yellowish patches below apex: secondaries are thickly sprinkled with yellowish, especially on the basal half, which is divided into two parts by a dark transverse line just beyond a pale yellowish discoidal spot, there are central and submarginal series of pale yellow spots; fringes as above. Expanse, 21 mm.

Seven specimens, including two examples of the female, taken at Ichang in June. One of the females has the number of spots in the submarginal series on under side of primaries increased to six, by the addition of one to the costal set.

I also received specimens of this species from a native collector at Ningpo, 1886.

Distinguished from other species of the genus by its small size.

BIZONE CRUENTA, sp. n.

♂. Primaries white, with crimson markings; a short basal transverse line, united by a streak along the costa with one traversing the wing from costa to inner margin, from the upper outer edge of this last line is a longitudinal wedge-shaped spot, followed by two black dots, placed obliquely, not as in *B. hamata* one under the other; beyond the middle is a second transverse line, uniting at each extremity with a broad apical and outer-marginal border. Secondaries pale crimson, shading to white at the base. Fringes white. Under surface of primaries: central area fuscous, with two ill-defined but contiguous black spots; secondaries as above. Head and thorax pure white, collar faintly flecked with crimson.

♀. Similar to the male, but on the upper surface the markings are paler, there is no longitudinal spot before discal dots, and the border of outer margin is not united on the costa with the preceding transverse line; the lower discal spot is not always clearly defined. Expanse, ♂ 25–28 mm., ♀ 24–29 mm.

Several specimens from Chang Yang, taken in May, July, and August; one female example taken in July at Ichang.

The male of this species is without costal fold or pencil of hairs.

SATURNIA OBERTHURI, sp. n.

♂. Ground colour of all the wings deep yellow; the discal area of primaries occupied by a large salmon-pink patch, its upper limit being the third median nervule, and reaching the inner margin; a black transverse

discal bar is set in a reniform spot of a pinkish brown colour, edged internally with black; basal line black, irregularly wavy; central line, from costa to inner margin, black, and has the appearance of a series of n-marks; outer line double, wavy, commencing from the apex, where it is white; it loses itself in a large black spot, then continues in a series of symmetrical black waves to the inner margin; submarginal line white, straight; apex suffused with a pale brown cloud; basal two-thirds of costa heavily clothed with thick dark brown scales. Secondaries with the salmon-pink patch and n-like central line as in primaries; basal line curved and indistinct; double outer line wavy, black throughout; white submarginal line wavy, traversing a broad band of dull orange-brown; discal spot very similar to that on primaries, but larger, bordered all round with black, and the bar bordered externally with violet-grey scales. Head yellow, collar and front of thorax blackish brown, remainder of thorax and body golden orange. Under surface with fainter markings; legs chocolate-brown, banded with pink. Expanse, 154 mm.

One male, taken near Ichang in August.

Mr. C. Oberthur, after whom I purpose naming this species, possesses a male specimen from Cochin China.

29, Hyde Park Gate, S.W.

COLEOPTERA AT CAMBER DURING 1889.

By W. H. BENNETT.

HASTINGS and the districts around it afford some remarkably good hunting-grounds for the coleopterist. By far the best of these (as far as my experience goes) is to be found near Rye, a quaint old town of considerable interest from an archaeological point of view.

Our business, however, is with the entomological features of the place. Immediately on leaving the town our hunting-ground begins. There are, at the foot of the hill on which the town stands, some miles of flat marshy land, intersected by more or less brackish ditches, the haunts of the *Octhebia*, &c.; and a mile or two off, near the mouth of the harbour, is a small range of sand-hills, similar in character to the well-known Deal sand-hills. They are not of large extent, only a mile or so in length, and very narrow. Judging, however, from the number of special sand-hill species found there we may, I think, safely conclude that at some former period they must have been much more extensive.

The following are the best species I have taken there during 1889:—*Dyschirius salinus*, plentifully, apparently associated with *Bledius unicornis* and *B. tricornis*, and also with *Heterocerus sericans*. *Dyschirius æneus* also occurred, but I could not find any *Bledii* at the same place with it. In March I took two specimens of *Masoreus wetterhallii* on moss, but could never find any more; so I suppose it is rare here. In moss, in early spring, I found *Amara bifrons* (not rare), *A. rufocincta* (one),

Harpalus rotundicollis, *anxius*, and *puncticollis*, and a single specimen of *H. cordatus*. *Acupalpus consputus* was rare by the side of a ditch, and the only Bembidiids that were worth mentioning were *B. mannerheimi* and *B. varium*. From the ditches I got *Hydroporus parallelogrammus* (plenty), *Agabus conspersus*, *Hydrobius oblongus*, *Octhebius margipallens*, *O. bicolor*, and *O. æratus* in plenty, and *O. punctatus* and *O. exaratus* rare. Under tidal refuse, on one occasion, *O. rufimarginatus* was to be found in the utmost profusion. It is curious that, although I take this species every year at Camber, I have never taken a single specimen in the water, but have invariably found them under tidal refuse from the river.

A few very good Staphylinidæ occurred. *Philonthus quisquillarius*, and var. *dimidiatus*, and *Actobius signaticornis*, under decaying vegetable matter almost in the water; *Bledius tricornis* (common but very local), *B. unicornis* ditto, *B. opacus* very sparingly. The rare *B. crassicollis*, hitherto only recorded from Deal, also turned up, but in very scanty numbers, the most determined searching only resulting in one or two specimens a day. As might have been expected, Trogophlœi occurred in numbers on the muddy sides of the ditches. *T. corticinus* swarmed in the spring, and *T. bilineatus* and *elongulatus* were both common. In carrion there occurred *Homalium riparium* (one), *H. fossulatum*, and *H. oxyacanthæ*; also *Aleochara algarum* and *A. obscurella* in numbers. On the sandhills I met with *Anisotoma calcarata* and *A. dubia*; and at the same place, in dead birds, I found *Saprinus maritimus* (common), *S. metallicus*, and *S. immundus* (sparingly); also a fine series of *Nitidula 4-pustulata*, and on one occasion I beat out of the dry carcass of a dog *Cryptophagus pilosus* and *Dermestes undulatus*. Among the Byrrhidæ, *Syncalypta hirsuta* was not rare among moss and stones, while on the banks of a ditch I got a nice series of the queer Scymnus-like *Limnichus pygmaeus*. *Heterocerus obsoletus* was common, and *H. sericans* I got in numbers for the first time, but it is very local. *Helops pallidus* occurred sparingly, and deep in sand. Among the weevils I got *Metallites marginatus* (two), *Hydronomus alismatis*, *Bagous lutosus* (one), and *B. tempestivus*. This last species seems excessively local here; I found it at one ditch only, and there it occurred in dry roots of grass in the utmost profusion. Some idea of the numbers can be gathered from the fact that I counted fifty in my paper at once after shaking a few handfuls of grass. The only other species worth mentioning were *Tanysphyrus lemnae* (common), *Phytobius leucogasta*, *Baris t-album*, *Phlæophagus spadix*, and *Hyperaspis reppensis*.

I have paid no attention to the Lepidoptera, but I have no doubt many good species occur. I might mention that a few

weeks ago, in an afternoon's hunting, I got more than fifty pupæ of *Gymnancycla canella*.

11, George Street, Hastings.

AN ENTOMOLOGICAL TOUR ON THE TABLE-LAND OF MOUNT ARTHUR.

By G. V. HUDSON, F.E.S.

(Concluded from p. 12.)

TUESDAY, January 24th, was occupied in collecting about Salisbury's Opening, round the base of Gordon's Pyramid. The sun was very hot, and nearly every tussock was enlivened by the presence of *Argyrophenga antipodum*, which is pre-eminently the butterfly of the table-land. It will be seen how widely the specimens of this insect taken here differ from those from Christchurch and the Dun Mountain, and individuals from other localities would probably exhibit further aberrations. The number of ocelli on the wings varies exceedingly; one specimen in my collection has them almost completely suppressed.

Of the large Crambi, *Crambus crenæus* is the commonest species, but is with difficulty distinguished from *C. isochylus* on the wing. *Crambus siriellus* is a finely-marked species, and a good series can be obtained with a little perseverance; but I understand from Mr. Meyrick that it is by no means confined to the alpine or subalpine regions, being found extensively on the low-lands. The brilliant little *Crambus helistes* may be seen flying about like swarms of small flies, in wet places, and is usually very common near the track. Where it leaves the forest, a fine species of *Hepialus* occurred, of which I managed to secure four specimens in all. It is said to be only a variety of *Hepialus variolaris*, a low-land insect; but I feel almost sure that it is an abundantly distinct species. Other species taken were *Arcteuthes chrysopeda*, *Notoreas paradelpha*, and a curious light form of *Chrysophanus boldenarum*, which was abundant on the shingle round the stream.

The morning of Friday, 25th, was devoted to the limestone caves, which are often rather difficult to find, but directions can be easily obtained from Mr. Heath, or the miners. In one of these a very remarkable orthopterous insect occurred. I regret to say that I was only able to obtain three male specimens. They are extremely active, and can leap two or three feet at a time; their capture is consequently attended with much difficulty in a dark cave, where one can only look about with a single candle. I much wanted to ascertain the food of these insects, but the caves seem devoid of any kind of fungoid vegetation, which I should imagine

that they would be likely to eat. No Coleoptera were observed; and in fact the only other insect was the luminous dipterous larva, which on examination proved identical with those found on the banks of streams in the forest round Wellington. In the afternoon we visited a singular gorge, chiefly remarkable for its steep sides and a large rock at the entrance, in the middle of the stream, somewhat resembling a sphinx in shape. This place is well worth visiting, and can be easily found by following down the first large stream which crosses the southern end of Salisbury's Opening. A peculiar species of *Ranunculus* was abundant on the steep sides, and many other rare looking plants. The insects taken were numerous, comprising, amongst the Geometrina,—*Larentia chionogramma*, *Cidaria purpurifera*, *Epyaxa semifissata*, *Larentia clarata*, and *Boarmia productata*. Of the Pyralidina, the genus *Scoparia* was, as might be expected, strongly represented, the following species being taken flying about the rocks: *Scoparia philerga*, *S. cymatias*, *S. trivigata*, *Xeroscopa niphospora*, *X. cyameuta*, *X. rotuella*, *Diptychophora interrupta*, *Æcophora griseata*, and many other Micro-Lepidoptera. In fact, the locality is so productive that I devoted two other afternoons to collecting there, and should strongly recommend any entomologist visiting the table-land to give it his close attention.

On Sunday, January 27th, I decided to work Mount Peel and the neighbourhood, and made an early start in the morning, arriving on the top of the mountain at about eleven o'clock. On our ascent, *Notoreas paradelpha* was common at about 4000 feet, where a black species of *Pyronota* also occurred. The first snow was met with at about 5000 feet, and shortly afterwards we again fell in with *Erebia pluto*, but not so commonly as on Mount Arthur. As, however, Mount Peel is so much better suited to collecting, a larger and finer series was taken here than on the former. I was also astonished to meet with the odd little *Chrysophanus boldenarum* up here. The butterfly is said to frequent river-beds in the South Island, but I am inclined to think that it is far more widely distributed, and have seen large numbers in the Wellington Province. A fine species of Locustidæ was also abundant on the rocks, and completely protective in its colouring; the same species occurred on Mount Arthur, and in both localities the insects were quite invisible when motionless. On returning, a visit was made to Lake Peel, where several specimens of the alpine Cicadæ (*Cicada montana*, Hud., MSS. name) were secured, as well as *Stathmonyma hectori*, and other interesting insects.

Monday, 28th, was devoted to setting specimens and collecting in the gorge; and on Tuesday we left the table-land, meeting with three specimens of *Dodonidia helmsii* on the track, all of which were unfortunately out of reach.

Perhaps a few notes on the low-land insects observed in this locality may be of some interest, as showing the range of altitude exhibited by many species. Amongst the butterflies, *Vanessa gonerilla* and *Chrysophanus salustius* were occasionally met with at about 3200 feet; they did not exhibit any noticeable divergence from the type. *Agrotis nullifera* was once taken at light, also *Scoparia diptheralis*, both being normal forms. *Crambus flexuosellus*, *Boarmia productata*, and *B. melinata* occurred occasionally from 2000 to 3500 feet, but were not very common; in all the specimens the markings were somewhat darker than usual.

Petalura carovei, the great dragonfly of New Zealand, was very abundant in swampy localities round Salisbury's Opening. I did not see any specimens above 4000 feet, while the smaller *Libellula smithii*, *Agrion colenisonis*, and *A. zealandica* were swarming almost everywhere, extending up to the top of the mountain. The ordinary flesh-flies (*Calliphora quadrimaculata*, *Sarcophaga læmica*, &c.) were, as usual, everywhere. I noticed many specimens on the top of Mount Arthur, while eating my lunch. I am quite at a loss to understand what supports such large numbers of these insects in such remote localities, and can only conjecture that they are endowed with an extremely keen sense of smell, and travel great distances in search of food.

Among Coleoptera, *Pyronota festiva* was everywhere abundant, and was perhaps slightly larger and more brilliant in colouring than the ordinary form, although I think specifically identical. *Ceratognathus foveolatus* occurred under the bark of the mountain birch; but, as I have before mentioned, I did not devote sufficient time to this order to judge at all accurately of its prevalence.

An inspection of the insects taken, arranged according to the elevation at which they occurred, will, I think, at once show that as the mountains are ascended the Lepidoptera become decidedly darker in colour. This has long been observed in other countries, but I think it is interesting to be able to contribute farther evidence from New Zealand. Respecting the cause of this peculiar phenomenon, there seems to be little doubt that it is owing to the low temperature existing at high altitudes, as the same effect has been produced artificially by retarding, by means of an ice-house, the development of three species of European moths (*Selenia illustraria*, *S. illunaria*, and *S. alniaria*), of which Mr. Merrifield gives a most interesting account in the 'Transactions of the Entomological Society for 1889.' Lord Walsingham has long ago suggested that a darker colouring or melanism is advantageous to alpine or arctic insects, as it enables them to absorb the sun's rays much more rapidly than if they were of a lighter hue; and he instances, as an example, the simultaneous emergence of a white and a black insect from the pupa in a stormy and cold climate, such as we have in the alpine regions. A passing

gleam of sunshine would enable the black insect to dry its wings, fly away, and propagate its species before the white one was nearly developed, and consequently there would be a continual selection in favour of the darkest varieties. This theory, I believe, is the true explanation of the singular prevalence of melanic species at high elevations, and may of course be equally well applied to those dark varieties and species of insects which have, hitherto, been almost invariably taken in the arctic regions. That there is a marked tendency to a darker coloration in the Lepidoptera from the Mount Arthur district as we ascend in altitude, I do not think anyone can for a moment dispute, who examines the representative collection now before the Society.

For those wishing to learn further particulars in connection with this most interesting subject, I must refer them to the abstract of Lord Walsingham's paper contained in the 'Entomologist' (Entom. xviii. 81).

In conclusion, I should like to give a very striking instance of protective colouring, which I observed when on a previous visit to the Table-land in 1888. While gathering some small branches from a birch tree, I discovered a beautifully variegated larva imitating exactly the delicate hues of the lichen-covered twigs. After feeding on the birch leaves for a few days it spun up, and emerged a very grey form of *Declana roccœ* on June 7th. I have often seen the larva of this insect, as before mentioned ('Transactions,' N.Z., p. 190, 1888), round Wellington, where, however, it does not in the least resemble the curious caterpillar found on the table-land. This circumstance, I think, gives us a hint as to the means by which alpine insects may have assumed some of their peculiarities.

In connection with my previous visit to the table-land in 1888, I should also mention that it was three weeks later in the year than in 1889, and I noticed great differences in the insects observed. For instance, in February, 1888, *Stathmonyma anceps* was very abundant; *Erebia pluto*, scarce; *Rhyssa antipodum*, one taken and three or four seen; *Cladopais mirus*, very common. In January, 1889, I found *S. anceps* was rare, *E. pluto* very abundant, and of *R. antipodum* and *C. mirus* I neither saw or captured a single specimen. This shows that there is a rapid succession of insect life on the mountains, which can only be properly studied by numerous and prolonged visits of entomologists.

Wellington, New Zealand.

ON THE OCCURRENCE OF *HESPERIA LINEOLA*
IN ESSEX.

BY A. J. SPILLER.

THE discovery of *Hesperia lineola* as a new British butterfly is an event of great interest to all entomologists, and in this case there is every reason to believe that the insect, although probably confined to one or two counties, will be found pretty plentiful where it does occur.

During my residence in Essex in 1885-8, I frequently came across the species referred to. In 1885 *Colias edusa* appeared sparingly in clover fields, and to obtain a series I spent many August mornings among the fragrant clover blossoms. Here I first noticed *H. lineola*, and although I suspected at first that my captures might be this species, yet their seeming abundance, and the fact that they flew with ordinary *H. thaumas*, led me to disregard this theory, and to accept as a solution of the problem that they were a local variety, due probably to their occurrence upon a chalky soil. In 1887, which was an exceedingly hot summer, the Pieridæ appeared in vast numbers in the clover-fields, and, expecting from the great heat that *C. hyale* or *C. edusa* would appear, I again assiduously searched the clover flowers. Neither *C. hyale* nor *C. edusa* appeared, but *H. thaumas* and *H. lineola* did, and in numbers that rivalled the "whites," nearly every field in one district producing these "skippers" in abundance. Still considering *H. lineola* to be but a local variety of *H. thaumas*, I did not capture the large numbers I might have taken, but after netting them simply selected those specimens which had the black bar least developed, in the hope of obtaining extreme varieties. I was particularly anxious to obtain males in which the black bars were altogether wanting, and consequently netted large numbers, letting those go which did not come up to my expectation of what a variety ought to be. The species was also plentiful in 1888.

I have now thoroughly overhauled the specimens in my cabinet, and find that I possess sixteen *H. lineola* in my series of *H. thaumas*. In order that no doubt may exist upon the matter, I have forwarded a pair to the Editor of the 'Entomologist' for identification. [The specimens are certainly referable to *H. lineola*.—ED.]

How long this butterfly has existed in Essex is a question I feel unable to determine. But I resided in 1874-6 at Stanstead in that county, and although in several of my entomological peregrinations I collected within a couple of miles of the spot where I recently found it so plentiful, yet I never met with *H. lineola* there.

I may say that although its head-quarters in my district were

a few miles from my late residence, yet I was in the habit of meeting with this form all around the neighbourhood,—sometimes in clover-fields, sometimes settled on flowers in corn-fields, and occasionally flying in grassy lanes. The time for its appearance would be the latter half of July and the beginning of August.

Butterflies, as a rule, are scarce in that part of Essex. In 1875 *Colias edusa* and *C. hyale* occurred plentifully, but *Vanessa polychloros* is the only local species I have found in fair numbers. *Leucophasia sinapis* occasionally occurs singly, likewise *Thecla w-album* and *L. argiolus*; and in 1887 *T. quercus* more frequently. The common skippers, *S. alveolus* and *T. tages*, are very local but fairly abundant; but *H. sylvanus* is met with everywhere with *H. thaumas*. The only fritillary I met with during four seasons was a single wandering *A. paphia*, in a country lane,—most probably a Rambler from some distant wood. Even such a common species as *L. egeria* seems to be non-existent. Butterflies being thus comparatively scarce was probably the reason why I paid so much attention to what I then considered to be a local form of *H. thaumas*, but which I now know to be *H. lineola*.

Chinnor, Oxon, January 10, 1890.

Hesperia lineola, a description of which is given by Mr. Hawes (Entom. 3), occurs in abundance, the first week in July, on the marshes near Purfleet, Shoeburyness. I possess five specimens only, but could, had I been disposed, have taken many scores last year.—F. G. WHITTLE; 2, Cambridge Terrace, Lupus Street, S.W.

RHOPALOCERA IN SWITZERLAND.

By R. S. STANDEN, F.E.S.

On my return to England, after an absence of six years on the Continent, I have been surprised and disappointed to find how strong a hold exclusive British Entomology still has upon the average collector. It is natural enough that we should treasure and make the most of insects that are unknown elsewhere, but how extremely limited is the list of them. The British Isles, as was remarked once by Mr. Bates, are but a "half-starved fragment" of the great palaearctic realm, and it seems to me that to limit one's researches to a small corner of a large area is to take an extremely narrow view of an important science.

In these days of cheap locomotion, too, it is hard to understand why the young student, who has long since exhausted his observations—for example, on the British butterfly—should not

burn to know something of its much more numerous congeners on the other side of the Channel. When one thinks that in little more than twenty-four hours one can reach the best collecting-ground in the South of France or the Swiss Alps, where in one day an active man may secure more species than the whole summer through in England, it seems strange that insular predilections should still so largely prevail. And what proper estimate, for instance, can we form here of the true characteristics of that alpine genus *Erebia*, with its meagre quotient of two, as compared with thirty distinct species and a vast number of varieties on the Continent of Europe alone? Or of our ten *Lycænidae* against fifty or more on the Continent?

For the benefit of those who are unfamiliar with the aspect of a Swiss Valley, from the lepidopterist's point of view, in the month of July, I may be allowed, perhaps, to recall a stroll up one of them, net in hand, on a warm day towards the end of that month. For most species the end of July is late, at the lower end of a valley, but there is often consolation higher up, where species that were ragged 2000 ft. below have here only just emerged. Where all are so beautiful and so prolific in insect-life, it is difficult to make a selection; but the one of which I have the most grateful recollections is the Visper-Thal, off the Valley of the Rhone. A friend and I explored it together in July, 1885. From Visp to Stalden is an easy walk of two hours along a pretty valley, where the vine is still in cultivation; a noisy stream rushes over its rocky bed beneath you, and the snowy peak of the Balfrein blocks out all further view ahead. The only rarity I met with here was a single specimen, much worn, of the var. *lycidas* of *L. zephyrus*. Until a year or two previously, Berisal, on the Simplon, was the only locality for this insect. I took two females of it also on the Gemmi in 1886. This is one instance among many of the fact before referred to, *viz.*, that, other conditions being favourable, the same insect may be found at widely varying altitudes, a difference in this particular case of some 4000 ft.

We stayed the night at Stalden, a most picturesque old village at the junction of the Saas and Zermatt valleys. At 6 o'clock the next morning we set out for Saas-im-Grund (5000 ft.), a three hours' walk, but expanded by us into nearly five, by reason of the many snares which beset our path—notably on approaching our destination, when the sun had full possession of the narrow valley, and species new to us were occurring at every step—the most abundant being *Polyommatus virgaureæ*, flitting dazzlingly among patches of its namesake, the golden-rod, and *Erebia tyndarus* and *goante* scattered generally over the meadows. We spent five days at Saas, working each day in different directions; but the most remunerative in species was one on which we walked up to Mattmark Lake (7000 ft.).

In the immediate neighbourhood of the Saas Hôtel five interesting members of the *Lycænidae* occur, viz., *optilete*, *pheretes*, *orbitulus*, *eros*, and *donzelii*, the deep violet of the first and the silvery grey of the last three being particularly striking when seen for the first time. A little further on a group of fritillaries enliven the scene—*Melitæa maturna*, *phœbe*, *aurelia*, *dictynna*; *Argynnis niobe*, with its var. *eris*, *A. pales*, and var. *napæa*. *Parnassius apollo* also occurs here pretty abundantly; and a little higher up, where the valley narrows, we took quite a modest series of *P. delius*, hovering gracefully along the margin of the stream, where they appear to suck the flowers of *Saxifraga aizoides*, on which also the larvæ are said to feed. Here the scenery begins to grow wilder; huge masses of rock shoot up above the larch, spruce, and birch, with which the slopes are still clothed, the boulders in the river are mightier, and there is a weird feeling of desolation ahead. We are now over 6000 ft. above sea-level, and the alpine *Erebias* are at hand—*mnestra*, *evias*, *gorge*, *euryale*. On a barren slope, just before reaching the lake, I took a worn specimen of the very local *Æneis ællo*, abundant some years on the Simplon.

The approach to the Mattmarksee is almost diabolical in its savage grandeur. A few scattered bushes of the alpine rose and a little brushwood are the only signs of vegetation; the narrow pass is choked with rocks and stones, and the Allalein Glacier forms a natural dam between the lake and the valley. From out of it rise colossal pyramids of cleft ice sheer against the sky, and from an ice grotto at the lower end issues the River Visp. In this wild spot, on a towering slope of loose shale—with not a particle of vegetation visible, and where a false step meant broken bones, if not something worse—*E. glacialis* was quite abundant, with an occasional var. *alecto*. But collecting under these conditions is too exciting to be agreeable, and we soon clambered over the little rocky pass down to the shore of the muddy lake, where a stunted kind of vegetation again appeared, and where we again came across a few specimens of *Lycæna pheretes*, *orbitulus*, and *eros*, in much finer condition than those we took 2000 ft. lower down. *Erebia lappona* was also common and fine at this spot.

There is a small inn here, where fair accommodation and Italian wines may be had. At Saas-im-Grund also is a capital hostelry—the Hôtel du Monte Moro—where board and lodging are only 5s. per diem; so that a fortnight's excursion to this valley from England may be accomplished easily and comfortably for from ten to twelve pounds.

I append a list of *Rhopalocera*, observed or taken, between Visp and Mattmark, in the third week of July, and shall be glad to give information about other valleys and hotels to any one desiring it.

The language of the Canton Vallais, where Visp lies, is German, but as it adjoins a French canton many of the people speak that language also. Kane's 'Handbook of European Butterflies' will be found a most useful *vade mecum*.

List referred to above. — *P. podalirius*, *machaon*, *P. apollo*, *delius*, *P. brassicae*, *rapæ*, *napi* *var. bryoniae*, *callidice*; *L. sinapis*; *C. phicomone*; *P. virgaurea* *var. zermattensis*, *hippotohe* *var. eurybia*, *alciphron*, *var. gordius*; *L. ægon*, *argus*, *optilete*, *zephyrus* *var. lycidas*, *pheretes*, *orbitalus*, *astrarche*, *eros*, *icarus*, *eumedon*, *escheri*, *donzelii*, *minima*, *semiargus*, *arion*, *var. obscura*; *V. urticae*, *io*; *M. maturna*, *aurinia* *var. merope*, *phœbe*, *didyma*, *var. alpina*, *dictynna*, *athalia*, *parthenie*; *A. euphrosyne*, *pales*, *var. napæa*, *latonia*, *niobe*, *var. eris*, *paphia*, *var. valesina*; *M. galatea*; *E. epiphron* *var. nelamus*, *melampus*, *mnestra*, *ceto*, *evias*, *glacialis*, *var. alecto*, *lappona*, *tyndarus*, *gorge*, *goante*, *æthiops*, *euryale*; *Æ. aëlo*; *S. hermione*; *P. mœra*; *E. ianira*, *lycaon*, *hyperanthes*; *C. satyrion*, *pamphilus*; *S. carthami*, *alveus*; *N. tages*; *H. thaumas*, *lineola*, *sylvanus*, *comma*.

Framingham Earl Hall, Norwich, December, 1889.

ON THE VARIATION OF *HELIOPHOBUS HISPIDUS* AT PORTLAND.

By N. M. RICHARDSON, B.A.

I think that I can give an explanation of the confusion that has arisen with regard to the violet tinge of *Heliohobus hispidus* at Portland. I sent to Mr. Tutt on Oct. 1st, 1888, specimens taken during September, and on Oct. 15th answered a letter of his asking about the violet tinge. It is probably a part of this letter that he quotes (*Entom.* xxii. 136), and so far as I remember I had not at that time noticed any distinct violet tinge.

This year I found that many specimens, when alive and for some time after death, were distinctly tinged with violet, or perhaps more accurately pinkish-lilac, but that after a few weeks this tinge entirely disappeared. At the present time, though I kept for myself several strongly tinged specimens, I cannot find a trace of this violet tinge in any of them.

Hübner therefore probably figured the moth alive or when very recently killed. I could not, however, say of any of the Portland specimens, even during life, that their "pale markings were of a delicate violet"; on the contrary, they are very pale ochreous, some of them being almost white: the violet is nothing more than a tinge, far less intense than the pink colour of a fresh specimen of *Xylocampa lithoriza*, and is, as I have said above, very evanescent. It is spread over the whole of the fore wings, but is most striking on the hind margin and fringes.

With regard to the varieties of *H. hispidus* found at Portland, I wish, in the first place, to correct the apparent meaning of a quotation which Mr. Tutt makes from a letter of mine (Entom. xxii. 137), "This (var. *pallida*) is a more common var. and very pretty." As he does not give the context, it would appear that I meant "more common" than his var. *argentea* (which represents, I suppose, the commonest form at Portland), whereas I have little doubt that I referred to a very small (1 in. 2 lines) and dark var. (his var. *obsoleta*?), of which I have only taken two specimens, one a good specimen of the extreme form, and one a bad specimen somewhat resembling it, which is the one I sent to Mr. Tutt. I have seen no others just like these two specimens, which differ from the ordinary form in being smaller, darker, and having less distinct though similar markings. All the other Portland specimens that I have seen resemble each other in the general style of their markings and in size (about 1 in. 5 lines), but vary a good deal in the shade of their ground colour, from very pale greyish brown to almost black. There is, as Mr. South says (Entom. xxii. 282), very little variation in the arrangement of the markings.

Between these two extremes there is every intermediate form, and it would be impossible to make any line of division, as a graduated series could be arranged in which the differences between consecutive specimens would be almost imperceptible. The bulk of the specimens are neither very dark nor very light, but the very light ones are commoner than the very dark ones. I have seen nothing that can be called a variety amongst the females; they vary a little in size, but are far more constant in shade of ground colour than the males, and never very light or very dark; they are much less handsome than the males, and of a less graceful shape.

I do not possess any Torquay specimens, so cannot unfortunately compare them with those from Portland.

Montevideo, near Weymouth, Dec. 21st, 1889.

GAS-LAMP ENTOMOLOGY.

By J. ARKLE.

WHY a moth should rush to a street-lamp, and decline to waste its energies in a straight course for the moon,—why, in other words, the insect should be attracted by artificial light, and shun that which is natural,—is a matter that has exercised the minds of philosophers, ancient and modern. Between the moral drawn from the question by the early Greek, and the speculation of the latter-day scientist, one thing to the entomologist is certain, that by taking moths "at light" he can add captures to

his collection which otherwise he might seldom, if ever, make. Among the methods of taking moths at light, these observations will be confined to the working of gas-lamps, to a method followed by me for years, and, lastly, with reference to captures made personally, with the exception of a solitary insect.

Perhaps our best hunting-ground here is a lonely road about half a mile south of the city. Along one side stretches a plantation of miscellaneous trees and undergrowth, chiefly oak; on the other is a footway, with lamps two hundred yards apart. Beyond this open fields stretch away into the country. A hawthorn hedge bounds the road on either side.

I rarely take a net, my only apparatus being a cyanide bottle—the cyanide (of potassium) being covered by a layer of cotton-wool—and a twelve-foot ladder, taken close by a few silent friends from a neighbouring graveyard. The bottle is an ordinary pomade-bottle; it fits the waistcoat-pocket, and so, with the aid of the cotton-wool, prevents the insects from rolling about. The ladder I prefer to all other appliances, because the outside, inside, and framework of the lamps can be examined. Again, the use of the ladder enables the entomologist to work with little interruption, the collector being taken as a rule for a "gas-man." Nevertheless, the night is sometimes varied by incidents more or less amusing. You become "a character well-known to the police"; nay, it is likely enough that the stalwart officer on the beat, in spiked helmet and greatcoat, may assist in "running in"—to the cyanide bottle—a refractory insect.

Many moths, not even singed by the flame, rest inside the lamps; many of course on the glass outside; but others, such as *Pœcilocampa populi* and *Asteroscopus sphinx* (*cassinea*), lie close to the framework inside, outside, and under the lamp, so that they are invisible to a spectator on the footway. Again, a female, finding herself imprisoned, will often deposit her eggs in the lamp, or she may be captured, taken home, and made use of for breeding purposes. All this can be best effected by means of a ladder. I have carried mine, to be modest, one hundred miles. It is well to have in one's pocket two or three chip-boxes to accommodate eggs or females. My only companion, in nine cases out of ten, is a trusted stick.

All moths are not equally attracted by the lamps. I never took a single hawk-moth, or a *Tæniocampa*, although the latter might be swarming on the sallows near. *P. populi* comes well to lamps; not so *Eriogaster lanestris*, its near relative. Up to 1889 I had only one record of *Plusia gamma*, when in that year the insect changed its character and became a nuisance. I never took a *Dicranura vinula*. But my experience goes to show that the great majority of moths, males chiefly, come to lamps, and more especially the Geometers. Among the latter, *Hybernia*,

Cidaria, and the "Thorns" are especially conspicuous. *Arctia caia*, *Spilosoma lubricipeda*, and *S. menthastri* are always certain to come in their season by the dozen. I helped an *A. caia* one night no less than three times out of my net, and over the hedge, until it returned a fourth time and fell a victim to a bat. *A. fuliginosa* I never even saw. *Hepialus humuli* rarely allows itself to be trapped, although dancing over the grass by the dozen; and *H. lupulinus* never, though equally common.

The best nights for lamp-hunting are those that are warm, dark, and still. Insects are very sensitive to temperature, therefore a thermometer below 50° F., marks a paucity of sport. Few moths, if any, will be abroad in moon or starlight. A strong wind is equally unfavourable. If the weather-vane points at all to the east, the entomologist may certainly rest indoors.

I have always observed two chief flights of moths in a night. With the dusk appear the Geometers; these are afterwards followed by the Noctuas; and this flight goes on till eight o'clock. After an apparent rest of a couple of hours, the second flight begins at ten, with diminished Geometers but increased Noctuas, and continues till midnight. The entomologist may then turn in and empty his cyanide bottle. He should have in readiness a large wide-mouthed pickle bottle, half-filled with chopped and bruised laurel leaves. On the top of the leaves, which should be well pressed down, a piece of perforated card should be placed, and fitting the bottle. On this the insects may be laid, when they will remain perfectly natural and relaxed for a week or more. Moths of a green colour, like the Emeralds, should be set at once; in fact, they should be removed from the cyanide bottle as soon as killed, pinned into a pocket-box, and set on reaching home. This is the secret in preserving the exquisite tint of an insect like *Geometra papilionaria*.

The entomologist at the top of his ladder on a favourable night looks into a veritable insect world. Thousands of gnats, many in their last struggles for existence, cover the bottom of the lamp. These gnats, when seen on the wing at the approach of dusk, are sure harbingers of successful sport. If it be the month of August, half a dozen Noctuas may be inside, sullen and quiet. A beetle or two, with numerous earwigs and three or four Geometers, swell the company. Some of the lepidopterous insects are scorched by the flame, but the greater proportion are fit for the cabinet. The whitish eggs on the glass inside are probably those of *Luperina cespitis*. Outside there will be more earwigs, a *G. papilionaria* if birches are in the neighbourhood, Noctuas, more Geometers; and all these, as a rule, will be as fresh as if straight from the chrysalis. Spiders are feasting busily on the dying gnats, and a bat flies up and down and about, taking, the meanwhile, a liberal tithe. The great pest

to the collector is a red ichneumon; a friend labels it, with a query, *Ophion*. This insect is a little larger than a wasp, and possesses a sharp and down-curved sting or ovipositor, which it can use in a very unpleasant manner. I have often small lumps the size of a pea, and more, raised on the back of my hands by these creatures, although the pain is by no means equal to the sting of a wasp or bee. The ichneumon gets into the lamps, or buzzes outside by the dozen, and seems to angrily resent all intrusion. The whole scene reminds one of the early Greek and his moral, viz., that these seductive lights are as fatal to the insect tribes as the sinful pleasures of this world are to women and to men. I will now append a list of Chester captures. Those marked with an asterisk are rare:—

JANUARY.—*Cheimatobia brumata*, *Hybernica defoliaria*, *Phigalia pedaria*, (*pilosaria*).

FEBRUARY. — *H. rupicapra*, *H. marginaria* (*progemmaria*), *P. pedaria*.

MARCH.—*Selenia bilunaria* (*illumaria*), *P. pedaria*, *Anticlea badiata*, *Anisopteryx æscularia*, *H. rupicapra*, *H. marginaria*, *Eupithecia abbreviata*.

APRIL.—*S. bilunaria*, *H. marginaria*, *A. æscularia*, *A. badiata*, *Triphosa dubitata*.

MAY.—*S. bilunaria*, *A. badiata*, *Melanippe fluctuata*, *Cidaria suffumata*.

JUNE. — *A. badiata*, *Coremia unidentaria*, *Melanippe montanata*, *M. fluctuata*, *Timandra amatoria*, *Camptogramma bilineata*, *Cabera pusaria*, *Acidalia aversata* with var. *remutata*, *Rumia luteolata* (*cratægata*), *Caradrina quadripunctata* (*cubicularis*), *Arctia menthastri*, *A. lubricipeda*, *Triphena pronuba*, *Agrotis exclamationis*, *A. segetum*, *Leucania comma*, *Scopula olivialis*.

JULY. — *Phorodesma pustulata** (*bajularia*), by Mr. J. Lyon Denson, Chester; *Uropteryx sambucaria*, *A. aversata* with var., *A. inornata*, *C. exanthemata*, *Geometra papilionaria*, *Abraxas grossulariata*, *S. illumaria* var. *juliana*, *Cidaria fulvata*, *Metrocampe margaritaria*, *Iodis lactearia*, *Camptogramma bilineata*, *Phibalapteryx vittata* (*lignata*), *Arctia caia*, *Liparis similis* (*auriflua*), *L. pallens*, *L. conigera**, *Noctua augur**, *N. plecta*, *Mamestra brassicae*, *M. anceps**, *Xylophasia monoglyphica* (*polyodon*), *Grammesia trigrammica** var. *bilinea*, *C. morpheus*, *C. alsines**, *Luperina cespitis*, *Plusia gamma*, *P. iota**, *Hepialis humuli* (?), *Ebulea sambucalis*, *Perinephele lancealis*, *Oedematophorus lithodactylus*, *Scopula prunalis*, *S. lutealis*, *Zanclognatha tarsipennalis*, *Diurnea fagella*, *Lemnaphila phryganella*, *Tortrix viburnana*, *T. rosana*, *Teras contaminana*, *Platyptilia gonodactyla*, *Crambus tristellus*.

AUGUST.—*G. papilionaria*, *Pseudoterpna pruinata* (*cytisaria*), *Hypsipetes sordidata* (*elutata*), the dark form; *A. grossulariata*, *Epione apiciaria*, *Crocallis elinguaris*, *Eugonia alniaria* (*tiliaria*), *Cidaria truncata* (*russata*), *Coremia unidentaria*, *C. designata* (*propugnata*), *M. fluctuata*, *C. pusaria*, *Eubolia limitata* (*mensuraria*), *E. cervinata*, *Boarmia repandata*, *T. dubitata*, *C. aversata*, *S. illumaria* var. *juliana*, *Halia vaularia* (*wavaria*), *Neuronia popularis*, *L. testacea*, *Noctua rubi*, *L. cespitis*, *L. pallens*, *A. caia*, *Ancho-celis lunosa*, *Orthosia lota*, *Calymnia pyralina**, *C. trapezina*, *Bryophila perla*

(a very diminutive form), *Triphæna ianthina*, *T. orbona*, *T. pronuba*, *P. gamma*, *Cænobia rufa*, *L. guenéei*,* *Rhacodia caudana*, *Conchylis straminea*, *Scoparia truncicolella*, *Tortricodes hyemana*, *Paraponyx stratiotatis*, *Botys ruralis* (*verticalis*).

SEPTEMBER.—*E. alniaria*; *C. truncata*, vars. *centum-notata*, *commenotata*, *perfuscata*; *C. immanata* and var. *marmorata*,* *M. fluctuata*, *E. apiciaria*, *C. testata*, *Hydræcia micacea*, *A. pistacina*, *A. lunosa*, *Xanthia fulvago* (*cerago*), *X. flavago*, *X. citrargo*, *Nonagria arundinis* (*typhæ*), *Cirrhædia xerampelina*,* *Amphipyra tragopogonis*, *L. similis*.

OCTOBER.—*Oporabia dilutata*, *Himera pennaria*, *C. miata*,* *A. pistacina*, *Diloba cæruleocephala*, *Hydræcia nictitans*, *Scopelosoma satellitia*, *O. lota*.

NOVEMBER.—*O. dilutata*, *H. pennaria*, *C. miata*,* *Hybernia defoliaria* (four well-marked forms), *C. brumata*, *O. lota*, *O. macilenta*, *Pacilocampa populi*, *D. cæruleocephala*, *Xylina ornithopus* (*rhizolitha*),* *S. satellitia*, *Asteroscopus sphinx** (*cassinea*).

DECEMBER.—*C. brumata*, *H. defoliaria*, *S. satellitia*, *P. populi*.

2, George Street, Chester.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ON THE NEED OF THE REVIVAL OF THE 'ENTOMOLOGISTS' ANNUAL'—In a short notice of vols. ix. and x. of the 'Proceedings of the Dorset Natural History and Antiquarian Field Club' (Entom. 24), a remark is made on the need of the collation and indexing of the proceedings of the various local and metropolitan scientific clubs or societies. This undeniable want appears to me to have been, practically, the very one so ably met for many years by Mr. Stainton and others, in the 'Entomologist's Annual,' which has now been defunct for sixteen years. Would it not be practicable for a conclave of our working entomologists to collate the various papers and notes published in the different journals since the 'Annual' disappeared, and publish the results, with such plates as could be afforded; and then to continue the work year by year? It can hardly be doubted but that subscriptions or contributions would be obtainable to supplement the deficit, if any, of the funds needed to bring out such a work: that is, supposing the sale by itself did not suffice. I have never, myself, ceased to regret the disappearance of that prime necessary to working entomologists, the annual yellow volume; and I feel sure a very large number of us would gladly aid in its resuscitation. Will not some of our leading entomologists move in the matter?—(Rev.) O. P. CAMBRIDGE; Bloxworth Rectory, January 11, 1890.

HESPERIA LINEOLA, Ochs.—In his record (Entom. 3), of the interesting discovery of *Hesperia lineola* as a British butterfly, Mr. F. W. Hawes seems to indicate that there is some divergence of opinion as to the specific distinctness of *H. lineola* and *H. thaumas*. Besides the rather slight but constant colour differences, there are also structural differences between the two species. These are shown in the genital armature of the males. It is impossible to give in words a good idea of this structure, but in the 'Transactions' of the Linnean Society, Second Series, Zoology, vol. i., pl. lvii. figs. 26 and 27, will be found illustrations of the parts.—F. BUCHANAN WHITE.

NOTE ON *CIDARIA IMMANATA* FROM ICELAND.—After careful examination of the specimens of *Cidaria* that I captured in Iceland during July and August, 1889, Mr. South arrived at the conclusion that all are referable to *Cidaria immanata*, and none to the closely allied *C. truncata (russata)*. By far the larger proportion of the specimens of *C. immanata* were taken at Arnefjord, Dyrafjord, and Onundafjord, on the west coast of Iceland, July 30th and 31st, and the greater number belong either to the dark typical form, or to the reddish one so common at Rannoch. The Rannoch form, so far as my observation went, is, on the whole, the most abundant, though typical *C. immanata* is widely distributed, occurring at Saudarkrok and Akureyri on the north, and Eskefjord on the east coast. I only captured five specimens of *C. immanata* at Reykjavik, and these were all of the Rannoch form. Its comparative scarcity in the neighbourhood of the capital may be attributed to the fact that it was then (July 26th), only beginning to emerge from the chrysalis. Its scarcity at Isafjord, on the west coast, and at all the fjords on the north and east coasts (after it had appeared in plenty elsewhere), can hardly be assigned to the supposition of its disappearance at so early a date as the first week of August; it is far more reasonable to suppose that the higher latitude of some districts, and the more Alpine character of other regions, or both causes combined, account for its absence or scanty appearance. It is perfectly true, that as I landed at thirteen fjords where no previous visit of any entomologist has been recorded, to my knowledge, I had no means of knowing the best locality for insects during the one or two hours or one day that I was enabled to spend there; but, on the other hand, it must be borne in mind that at certain of these fjords above-mentioned Geometridæ were easily discovered, occurred in plenty, and very near the landing-place, and also that my experience of the rarity of moths at Siglufjord tallies with that of Finsterwalden in 1856, this being the only place adjacent to the Arctic Ocean that was similarly surveyed by the German Expedition of that year. Var. *marmorata*, among the Iceland specimens, is somewhat sparingly represented. Of the form of *marmorata* in which the reddish tint is suffused over the whole of the fore wings, instead of being confined to the base and extremities, as in the ordinary type of this var., there are only two specimens, and these are from Dyrafjord. There is also one specimen of "*pythonissata*" of Millière, from Arnefjord. As regards Icelandic varieties, I took two specimens of this moth, shortly before leaving Reykjavik, that I named "*cjornensis*," as found in the sloping meadows above "*cjorn*," or the lake in rear of the cathedral, but which I found to have been previously discovered by Staudinger, and by him named "*thingvallata*," from Thingvellir, the place of its capture. The name *cjornensis* may, however, possibly be allowed to stand, in reference to an intermediate form between the ordinary *marmorata* and the *thingvallata* of Staudinger, of which I also took two specimens, one above the *cjorn* or lake, and the other a few days later, at Dyrafjord. It is remarkable that this last var. exactly corresponds to one in Mr. South's collection, taken at York.—(Rev.) F. A. WALKER, D.D.

SUGARING. — My own experience quite agrees with all that has been written recently, respecting the comparative failure of sugar in attracting Lepidoptera. I think the subject of interest, and should like to see the opinions of experienced collectors as to the cause of this unproductiveness, which has been noticed by so many. Somewhat indifferent health has

necessitated my confining my sugaring-grounds to the trees surrounding our house, and in our own neighbour's garden. There is a tolerably good variety, comprising elm, lime, poplar, willow (*Salix alba*), with hedges of hawthorn and blackthorn. In some years my sugar-patches rendered a good return of moths, my captures numbering about fifty different species. Now, for three or four years past, night after night, sugaring has been almost of no avail. Can it be a case of inherited instinct? and are the rising generations of moths getting too wise to be trapped by the sugaring baits? The evolutionists tell us many wonderful stories; can they help us to arrive at some conclusion in this instance? Why is it that certain species of Lepidoptera are so rare? Is it to be attributed to the female laying but a limited number of eggs, to a delicate constitution in the larva and pupa, to more than ordinarily persistent attacks from ichneumon flies and other enemies, or, more probably, from a want of knowledge of the habits of these species? In the year 1878 I had the good fortune to capture at sugar the specimen of *Leucania albipuncta* mentioned in my list. The late Mr. Buckler was very anxious to obtain ova, and asked me to do my best in procuring some for him. In company with a friend, I have yearly made a strict search in hope of finding another, but without success. Again, in the case of *Laphygma exigua*, taken here in a clover-field by my brother last year; although we tramped the same field day after day, over and over again, both last year and this, not another was to be seen. It is easier to understand why some insects should be *local*; this may arise from the food-plants being confined to definite areas; but why a moth, capable, I should suppose, of by no means a long-sustained flight, such as these two species, should turn up only here and there singly, remains to me inexplicable. We cannot, I think, conceive that these, like the swift and strong-winged Sphingidæ, which perhaps often are so, are immigrants from distant lands; there can be little doubt of their being "true-born Britons"; and it seems to me likely that many species are rare, mainly on account of some particular and curious habit of concealment of which we are not cognisant.—JOSEPH ANDERSON, JUN.; Chichester.

Sugaring seems to have been rather a failure this season in most places; but in South Devon, where I was staying early in September, I found it by no means unproductive. Some twelve common species of Noctuæ were abundant, while a few specimens turned up of *Noctua glareosa*, &c., and one each of *Thyatira batis*, *Hydræcia micacea*, *Noctua umbrosa*, and *Luperina cespitis*. A few common Geometridæ, such as *Cidaria truncata* and *Larentia viridaria*, also came to the sugared patches. All these were taken from six or eight trees skirting the north-west side of a wood. The moon was shining during each of the six nights that I sugared, which were for the most part cloudless.—R. M. PRIDEAUX; 9, Vyvyan Terrace, Clifton, Bristol.

FORCING PUPÆ OF *D. GALII*.—In the 'Entomologist,' xxii. p. 202, I read the words, "By all means force your *galii* pupæ." Not being the fortunate possessor of *galii* in pupæ at the time, I obtained three, as much for the experiment as otherwise. I commenced forcing under the directions given by Mr. J. Arkle, placing my pupæ under a glass, beneath which I placed a small thermometer, keeping the whole near a fire. The highest temperature reached 120° Fahr., the lowest 40°. I placed my three pupæ beneath the glass on Nov. 11th, and on Dec. 15th the first emergence took place, the second on the 26th, the third on the 30th of the

same month. Free and frequent damping with tepid water is one of the most essential things connected with forcing pupæ. I am of opinion dryness is far more fatal than heat. — T. WALPOLE; 9, Dudley Terrace, New Somerby, Grantham, January 6, 1890.

LEPIDOPTERA IN 1889.—

New Forest.—On July 15th last I arrived at Brockenhurst to spend the two succeeding days collecting Lepidoptera. The following were among my observations:—*Apatura iris*: I captured a fine female, the only one I saw during my short stay. It was resting with outspread wings upon the wet ground in the shade, undoubtedly beaten from the oaken foliage overhead by the torrents of rain that fell during the night and early morning; it being still quite early in the day when I found it. *Limenitis sibylla* was fairly plentiful, but mostly in worn condition. *Argynnis paphia*, plentiful and in very fine condition: I took one male with a pale yellow spot on each of the primaries, and a female with two straw-coloured spots on each primary; I secured ten of the var. *valesina*, all except one being in the finest condition; eight of these I took on the 17th. Considering *A. paphia* was not so abundant as usual, *valesina* was out in large proportion. In a low-lying part of the Forest, where the wild gladiolus grows, many species of Diptera swarm, such as the great *Tabanus bovinus*, and the tormenting blood-drinking *Hæmatopota pluvialis*, whose bite is only too well known. In this particular spot I noticed *A. paphia*, especially the females, were all in the most perfect condition and in great numbers; it was here, too, where I found the beautiful *Calopteryx virgo*. *Argynnis aglaia* I found very abundant on a rough grassy opening, settling on the thistle bloom. I took a fine series (but mostly males) in a few minutes. *A. adippe* appeared very scarce; I noticed only two or three, and they were much worn. *Lycæna ægon* was out in abundance; some of the males were of large size. *Satyrus semele* I found just out on the wing; males in plenty, but one female only. *Lithosia quadra*: I took but one specimen, a female, at rest on the trunk of the knight-wood oak. *Vanessa polychloros*: not one specimen seen, and I heard of none being taken this year in the Forest. It is now many years since I had the pleasure of taking this fine insect; in the years of 1872-3 it absolutely swarmed in South Suffolk, since which time I have taken but one solitary specimen, and this was at rest on palings in the Croydon district in 1874.—F. W. FROHAWK; October, 1889.

Rotherham.—In this district the year 1889 opened with cold winds and much wet, the insects usually appearing in February and March being much behind time, and the season did not fairly commence before April. Larvæ searching during April was not a success as compared with 1888, when the abundance of several species was remarkable, although *T. finbria* was fairly plentiful if well searched for on the docks and low herbage. At the end of April and first week in May the willows were in bloom, and I found plenty of work, insects being abundant; but owing to the difficulty of getting at the willows, many of them being in the thick brush, a patch of trees were sugared in the hope that we might be fortunate in taking a few stragglers. I was very agreeably surprised to find that, notwithstanding the close proximity of the willows, a number of Tæniocampidæ visited the sugar, including *P. leucographa*, *P. rubricosa*, *T. munda*, and *T. populeti*, as well as other insects, hibernated *S. satellitia* and *C. vaccinii* being very abundant. During the first half of May very few visits to the woods were made, the weather being wet and cold, and towards the latter end of the

month there was a very heavy thunderstorm, accompanied with hail, which had the effect of beating a great number of larvæ from the trees, — some never to get up again: this was plainly evident in the case of *T. w-album*, for when we worked the elms, on several occasions in vain, a few pupæ only were taken from the low bushes and ground herbage later on. During June sugaring was persistently carried on two and three times weekly, with results almost *nil*; from the 9th of the month to well into July no rain fell; the nights were remarkably still with heavy dew; no insects came to sugar, although plenty were flying; the low bushes and ground herbage were covered with a sweet sticky substance, which proved a successful counter attraction to our sweets. Larva beating was usually carried on after the sugaring, commencing just before daybreak, and, to make up for disappointment in the matter of imagos, larvæ were fairly plentiful,—that of *C. flavicornis*, though difficult to beat during the daytime, now comes down quite easily; in addition to that insect *B. parthenias* was plentiful; a few *G. papilionaria*; also *P. populi*, *N. hispidaria*, and *C. paleacea* (*fulvago*). Both these last are new to the district, the latter especially so, as I am assured by an eminent Yorkshire entomologist that before it turned up here in 1888 only two specimens are recorded for this county. The larva of *D. bifida* has not shown up at all, and I only saw two or three of *N. dictæa*, *N. dictæoides*, and *N. dromedarius*. *N. ziczac* was fairly plentiful; but the pretty little *L. halterata*, usually abundant most years, has been exceedingly scarce.—JOHN N. YOUNG; 85, Fitzwilliam Road, Rotherham.

Monmouthshire.—At the beginning of August, 1889, *Argynnis paphia* was extremely abundant along the banks of the Wye; there were literally thousands to be seen in the course of a walk, in splendid condition. *A. adippe* was also present, though not in the same abundance as *A. paphia*; but I did not see any specimens of *A. aglaia*. I took several of *Vanessa c-album* in fine condition. I also took two specimens of *Thecla w-album*, and saw others. There were a few *Thecla quercus* about, though these were not by any means plentiful. Several of the commoner butterflies were conspicuously absent: thus I saw none of the genus *Lycæna*, and no *Hesperidæ*. The only moth I captured was a solitary specimen of *Angerona prunaria*. I saw great numbers of larvæ of *Eucheliu jacobææ* on the ragwort, and succeeded in rearing some of them. I found also many troops of young larvæ of *Bombyx quercus*: they were nearly all attacked by a kind of slug, owing probably to the wet summer. The most abundant insects in the locality were certainly *Argynnis paphia* and *A. adippe*. I noticed that all the Lepidoptera seemed much attracted to the banks of the river.—G. L. PATTEN.

COLIAS EDUSA IN 1889: ADDITIONAL RECORD—YORKSHIRE.—I saw on the 5th Sept., 1889, a fine male specimen, whilst driving near to Bishop Wood, on the Selby and York road. —SAMUEL WALKER; 75, Union Terrace, York, January 4, 1890.

ACHERONTIA ATROPOS IN 1889: AN ADDITIONAL RECORD—SOMERSETSHIRE.—To the list in the 'Entomologist' of localities in which *Acherontia atropos* appeared last season, I can add Clevedon, Somersetshire. Several larvæ and pupæ having been found, a friend, —a very careful collector,—was successful in rearing many imagos. All his pupæ were placed on the top of earth covered with a thick layer of moss, which was kept very damp. The box with the pupæ was placed against a

wall at the back of the kitchen range, so that the heat coming through the wall, kept up a warm temperature. The imagines commenced to emerge at the time they usually do in the natural state.—T. B. JEFFERTS; Blandford, January 6, 1890.

SPHINX CONVULVULI IN 1889: ADDITIONAL RECORD, SUSSEX.—A specimen was taken at the head of the old pier here in September, apparently attracted by a gas-light. The length of the pier is 1130 feet, and surely an exceptional place to find this insect?—LOUIS MEADEN; 15, Elm Grove, Brighton.

ENTOMOLOGY OF HOLLAND AND BELGIUM.—I should be glad if any readers of the 'Entomologist' could give me the names of publications containing information respecting the above, especially relating to the Forest of Ardennes; also where I may obtain a list of the butterflies of the above-mentioned countries.—W. H. BATH; Ladywood, Birmingham.

ERRATUM.—In my "Notes on *Agrotis ashworthii*," in January number, the bottom line on page 6 should read "the back of each segment two oblong marks of intense," &c.—WILLOUGHBY GARDNER.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*January 15, 1890, the 57th Annual Meeting.*—The Right Honble. Lord WALSHINGHAM, M.A., F.R.S., President, in the chair. An abstract of the Treasurer's accounts, showing that the finances of the Society were in a thoroughly satisfactory condition, was read by Dr. Sharp, one of the Auditors. The Secretary then read the Report of the Council, from which it appeared that the Society had lost during the year several Fellows by death and had elected 24 new Fellows; that the volume of Transactions for the year extended to nearly 600 pages, and comprised 23 memoirs, contributed by 20 authors and illustrated by 17 plates; and that the sale of the Society's Transactions and other publications is on the increase. It was then announced that the following gentlemen had been elected as Officers and Council for 1890:—President, The Right Honble. Lord Walsingham, M.A., F.R.S.; Treasurer, Mr. Edward Saunders, F.L.S.; Secretaries, Mr. Herbert Goss, F.L.S., and the Rev. Canon Fowler, M.A., F.L.S.; Librarian, Mr. Ferdinand Grut, F.L.S.; and as other Members of Council, Mr. J. W. Dunning, M.A., F.L.S., Captain H. J. Elwes, F.L.S., Mr. F. DuCane Godman, M.A., F.R.S., Dr. P. B. Mason, F.L.S., Prof. R. Meldola, F.R.S., Mr. R. South, Mr. Henry T. Stainton, F.R.S., and Mr. Roland Trimen, F.R.S. Lord Walsingham nominated Mr. J. W. Dunning, Captain Elwes and Mr. F. DuCane Godman, Vice-Presidents for the Session 1890—1891, and he then delivered an Address. After remarking on the attractive beauty of some of the larger diurnal Lepidoptera, and the brilliant metallic colouring of certain species of Coleoptera, the influence that such magnificent examples of the wealth of design in Nature might have upon artistic taste, and the consequent refinement and increased enjoyment of life, Lord Walsing-

ham referred, in illustration of the practical usefulness of entomological studies, to the successful importation into California of the Australian parasites infesting the scale insect (*Icerya purchasi*), which had proved so noxious to the orange plantations. Through the efforts of Prof. Riley, upwards of 10,000 parasites had been distributed and had since spread very widely, so that in many localities the orange and other trees hitherto thickly infested with this noxious insect had been practically cleared of it by their aid; he also referred to the successful fertilisation of red clover in New Zealand by the importation of impregnated queens of the common humble-bee, and to the uses to which the silk produced by various exotic species of Bombycidae had now been successfully applied. Reference was then made to the investigation instituted by Mr. Francis Galton, and to the experiments of Mr. F. Merrifield, with the view of determining the percentage of hereditary transmission to successive offspring by different generations of successors, and to the valuable auxiliary such experiments and the researches of Professor Weismann, Mr. Poulton, and others might prove to the study of the laws of heredity, protective resemblance, and natural selection. It was then observed that even if the study of Entomology could claim to have conferred no greater benefits upon the human race than to have afforded to many members of our urban population an inducement to improve their minds and recreate their bodies, it would have contributed in no small degree to the sum of human health, happiness, and morality; in connection with these remarks he quoted the words of the Abbé Umhang in his obituary notice of Henri de Peyerimhoff, "J'ai connu plus d'un jeune homme qui s'est passionné pour une branche de l'histoire naturelle, et je n'en ai vu aucun s'écarter du chemin de la vertu et de l'honneur." Attention was then drawn to the enormous numbers of species of Insecta as compared with the numbers of species of other orders of the Animal Kingdom, and an approximate estimate was made of the extent of the field of Entomology, and of its relation to other branches of biological study. In connection with the subject of the principal works in Entomology continued or completed during the year, special mention was made of the 'Biologia Centrali Americana,' by Messrs. Godman and Salvin, and the 'Revisio Insectorum Familiae Mantidarum,' by Professor Westwood. In conclusion, Lord Walsingham referred to the losses by death during the past year of several Fellows of the Society and other entomologists, mention being made of Mr. F. Bond, Dr. Signoret, Mons. Puls, Colonel C. J. Cox, Pastor Holmgren, Dr. Franz Löw, Dr. Karl Venus, and the Rev. J. G. Wood. A vote of thanks to the President for his services during the year and for his address was proposed by Mr. H. T. Stainton, seconded by Prof. Meldola, and carried. Mr. Elwes then proposed a vote of thanks to the other officers of the Society, which was seconded by Dr. Sharp and carried. Lord Walsingham, Mr. Goss, Canon Fowler, and Mr. Grut replied.—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—December 12th, 1889. T. R. Billups, President, in the chair. Mr.

A. Beaumont, of Lewisham, was elected a member. Mr. R. Adkin exhibited very strongly marked specimens of *Peronea sponsana*, from the New Forest. Mr. South remarked that nearly all the examples of this species he had taken at Haslemere were of this form, although the markings were not quite so dark. Mr. Barrett said that he had had considerable experience of collecting at Haslemere, but had never met with this form, which was evidently a local race. Mr. Tugwell exhibited pale grey specimens of *Taniocampa gracilis* from the London district, and reddish examples of the same species from the New Forest. Mr. Ince, a large collection of spiders from Switzerland. Mr. Carpenter, varieties of *Hybernia defoliaria*. The Secretary read a note from Mr. T. D. A. Cockerell, upon "The Colours Red and Yellow," and Mr. South made some observations thereon.

January 9th, 1890.—The President in the chair. Messrs. F. H. Atkinson, of Pimlico; C. F. Johnson, of Highbury; and F. Grover, of Westminster, were elected members. Mr. Hawes exhibited specimens of *Hesperia lineola*, and remarked that he first met with this species flying with *H. thaumas*, and was of opinion that *H. lineola* appeared when *H. thaumas* began to get worn. Mr. Carrington also showed examples of *H. lineola*, taken by himself about twenty miles from where Mr. Hawes captured his. Mr. Weir exhibited Continental examples of *H. lineola*, also a specimen which he had taken many years ago, but was not certain whether in Kent or Sussex, and an example of *H. thaumas* from Sussex, which bore a very close resemblance to *H. lineola*. Mr. South exhibited the specimens of *Peronea sponsana* from Haslemere, referred to at the last meeting, and made some observations on the named varieties of this species. Mr. R. Adkin, a short series of *Nepticula fulgens*, received from Mr. Vine, of Brighton. Mr. Carrington, an example of a butterfly which had been sent to him for identification, and was stated to have been captured in England, the species being *Syrichthus andromeda*. Mr. Billups, *Andrena nigro-ana* and its internal parasite *Stylops*, taken at Dulwich, 1889; and on behalf of Mr. Bennett, of Hastings, a living series of *Andrena clarkella* and its rare parasite *Nomada borealis*, taken from its nidus, on the 6th of the month, at Hastings. A communication was read from Mr. Strong relating to an immense swarm of moths at Williamstown about the end of October last.—H. W. BARKER, Hon. Sec.

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY. — The annual meeting of this Society was held on January 13th, in the Free Library, William Brown Street, Liverpool. The President, Mr. S. J. Capper, F.L.S., delivered an address, in which, among other matters of interest to entomologists, brief reference was made to the history of the Society since its foundation in 1877. The inaugural meeting was held at Mr. Capper's house, at Huyton Park; the original members were eleven in number; and the first President has been re-elected, year by year, up to date. Meetings are held on the second Monday in each month, and entomological visitors will be sure of a cordial welcome.

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[No. 322.]

THE EVOLUTION OF INSECT-GALLS.

By T. D. A. COCKERELL.

PROF. G. J. ROMANES, in 'Nature,' November, 1889, p. 80, has a letter on the subject of galls. After quoting Mr. Mivart's remarks on the "disinterested" nature of galls, he himself also says that he has always considered gall-formation "one of the most important facts in organic nature with reference to the theory of natural selection;" and this because it is "the one and only case in the whole range of organic nature where it can be truly said that we have unequivocal evidence of a structure occurring in one species [the plant] for the exclusive benefit of another" [the gall-insect].

The assumption then is that the various forms of galls are formed solely, and have been evolved only, for the benefit of the gall-insects themselves, a phenomenon which Prof. Romanes justly regards as very exceptional. But the exception seems to me to be only apparent and not real.

Let us consider the probable phases in the evolution of galls. Doubtless there were internal plant-feeding larvæ before there were galls; and, indeed, we have geological evidence that boring insects date very far back indeed. The primitive internal feeders, then, were miners in the roots, stems, twigs, or leaves, such as occur very commonly at the present day. These miners are excessively harmful to plant-life, and form a class of the most destructive insect-pests known to the farmer: they frequently cause the death of the whole or part of the plant attacked. Now, we may suppose that the secretions of certain of these insects caused a swelling to appear where the larvæ lived, and on this excrescence the larvæ fed. It is easy to see that the greater the excrescence, and the greater the tendency of the larvæ to feed upon it, instead of destroying the vital tissues, the smaller is the amount of harm to the plant. Now the con-

tinued life and vitality of the plant is beneficial to the larvæ, and the larger or more perfect the gall, the greater the amount of available food. Hence natural selection will have preserved and accumulated the gall-forming tendencies, as not only beneficial to the larvæ, but as a means whereby the larvæ can feed with *least harm to the plant*. So far from being developed for the exclusive benefit of the larvæ, it is easy to see that, allowing a tendency to gall-formation, *natural selection would have developed galls exclusively for the benefit of the plants*, so that they might suffer a minimum of harm from the unavoidable attacks of insects.

But here it may be questioned—Have we proof that internal feeders tend to form galls? In answer to this I would point out that gall-formation is a peculiar feature, and cannot be expected to arise in every group of internal feeders. But I think we can afford sufficient proof that wherever it has arisen it has been preserved; and further, that even the highly complex forms of galls are evolved from forms so simple that we hesitate to call them galls at all.

Let us first take the Hymenoptera, which form so many galls. The North American oak-galls, formed by species of Cynipidæ, afford every gradation of character. They may be divided into sections; the galls in the first section being so essentially part of the branch that they cannot be removed without taking away part of the branch or twig with them. The second section comprises galls on the branches, but of a different substance from the branch, so that they can be removed without taking a portion of the branch with them. Then of leaf-galls we have again two sections, one consisting of galls which cannot be separated from the leaf, the other of galls which are separable from the leaf-tissues.* Finally, there is a section comprising galls on the roots.

To take individual instances: the gall of *Andricus cryptus*, Ashm., is hidden under the bark, so as to be invisible externally. The gall of *A. gemmarius*, Ashm., is tubular or fusiform. But a third species in the same genus, *A. pomiformis*, Bass., forms a globular polythalamous gall. *A. piger*, Bass., forms a swelling of the leaf; but *A. virens*, Ashm., forms a true globular leaf-gall. So that, although we cannot actually observe the evolution, its stages have been preserved for us in certain species. *Diastrophus fusiformans*, n. sp., forms merely fusiform swellings of the stems of *Potentilla* in Custer County, Colorado; but *D. potentillæ*, Bass., forms oblong spongy galls.

The rose-galls also show us various stages of evolution. In Custer County, Colorado, we have three kinds of leaf-galls on roses. *Rhodites rosæfoliæ*, mihi, forms galls which are nothing

* See 'On the Cynipidous Galls of Florida,' by W. H. Ashmead.

more than flattish swellings of the leaflets. The galls of *R. globosus*, n. sp., are globular, and very little attached to the leaf; and *R. spinosellus*, n. sp., makes globular spiny galls on the leaves, like those of *R. bicolor* in miniature. Of rose-galls on the stems we get first fusiform or irregular roughish galls on the stems and branches, formed by *R. fusiformans*, n. sp., and occurring at West Cliff. Next are globular smooth galls, the product of *R. ignota*, Osten Sacken, and larger and roughish globular galls formed by *R. tuberculator*, Riley. Finally, the galls of *R. bicolor*, Harris, are globular and excessively prickly, while those of *R. rosæ*, Linn., develop moss-like hairs.

Some sawflies, as *Phyllæcus integer*, Norton, are simple internal feeders in twigs; but species of *Euura* and *Nematus* form true galls. In North America nine species of sawfly galls occur on the willow.

Turning to Diptera the same gradations of types are to be observed. The swelling produced by *Cecidomyia destructor*, Say, is hardly to be called a gall, and is quite inconspicuous—yet how destructive! Compare this with the white, woolly, conspicuous galls of *Trypeta bigeloviæ*, n. sp., produced in abundance at West Cliff, Colorado, on *Bigelovia*, and yet apparently not injuring the plant seriously at all.

Cecidomyia, which reaches its maximum of destructiveness in the non-gall-making species, as *C. destructor*, yet has myriads of forms producing genuine galls. Thus on *Carya* are eight species of galls produced by *Cecidomyia*.

The Dipterous willow-galls of West Cliff, Colorado, are very instructive. A species doubtfully referred to *Cecidomyia salicis-nodulus*, Walsh, produces an elongate fusiform hard woody swelling of the stem, hardly a true gall at all. *C. silicis-saliqua*, Walsh, makes broader reddish fusiform swellings, which are very conspicuous. Then *C. salicis-batatas*, Walsh, or an allied species, forms large irregular potato-shaped galls at the end of the twigs.

Among Lepidoptera we have any number of internal feeders, which there is no occasion to enumerate; but *Gelechia galle-solidaginis*, Riley, forms genuine galls on *Solidago*. Many other Lepidoptera have been bred from galls, but in most cases the evidence points to their being mere inquiline.

I think I have now given sufficient evidence to show that we have all the gradations from mere stem-borers to complicated galls, and the idea that they evolved in the way I have indicated is irresistible.

The study of galls and the rearing of gall-insects is a most fascinating pursuit, offering much chance of new discovery. Galls may be collected in the early spring, and as the warm weather comes on they yield their inhabitants without any

special attention. It is surprising to me that galls and their inhabitants are not more a subject of study among entomologists.*

West Cliff, Custer Co., Colorado, January 23, 1890.

NOTES ON THE ECONOMY OF *RETINIA RESINELLA*, LINN.

By R. ADKIN, F.E.S.

In the spring of 1888, I heard from Mr. Salvage, who was then collecting in the neighbourhood of Forres, that a number of the twigs of the Scotch fir (*Pinus sylvestris*, L.) had attached to them nodular masses of resinous matter containing larvæ, which he believed to be those of *Retinia resinella*, and I subsequently received some of the twigs from him. These I placed in sand, kept moistened so as to prevent the twigs becoming unnaturally dry, and allowed them to remain out of doors until the imagines emerged; in the interim observations were made, with a view, more especially, of ascertaining any facts that might have a bearing upon the opinion that had been expressed, that the larva of this species occupied a period approaching two years in feeding up.

Examining the twigs externally when received, it was evident that the resinous nodules were invariably fixed to wood of the previous year's growth; that what should have been the leading shoot of the then present year was much dwarfed, and in some cases represented by little more than a bud, giving the impression that it had been mined at some anterior period. This at once suggested an examination of the interior, but as it would have been necessary to open several twigs to gain any satisfactory information in this direction, and as such a proceeding was calculated to kill the larvæ, it was postponed until such time as the moths should come forth; only a sufficient number of the nodules being opened from time to time to ascertain the condition of their tenants. In due course the desired conditions were fulfilled, and it was then found that the most satisfactory method of arriving at the object in view was by cutting longitudinally through the twig and nodule together, the fibre of the former and the semi-crystalline substance of the latter yielding readily to the persuasive dissecting knife, and thus exposing to view in section the workings made by the larva throughout its life. These may be briefly summarised thus:—A narrow gallery under the bark of the twig, on the side opposite to that to which the nodule is attached, commences at a point nearly level with the

* Note.—I am indebted to Dr. C. V. Riley and Mr. W. H. Ashmead for identification of several of the galls mentioned. The new species will be fully described hereafter.

centre of the nodule, thence proceeding to the base of the young shoot, which is completely hollowed out, and entering the nodule, which is divided into an inner and an outer chamber, at the upper end of the latter, the inner apparently being reserved for pupation. The order of procedure in the formation of these workings would appear to be as follows:—The young larva upon leaving the egg eats through the bark of a twig near the extremity of the old wood, and taking a course in the direction of growth, keeping always on the same side, soon reaches the young growing shoot, upon the soft wood of which it feeds, probably consuming it during the summer of its first year. It now becomes necessary that it should provide for passing the winter, and having weakened the terminal shoot by reducing it to a mere shell at its base, it is desirable that it should provide a more substantial habitation in which to weather the storm; it is probably at this time that the bark is again pierced, but on the opposite side to that by which the larva entered, and by a larger hole, through which the sap would flow readily, and, congealing as it reaches the air, at once begin to form a resinous mass, which by its own weight, would spread in the direction of the trunk of the tree, the larva as it does so following its movement, and, by removing the bark as it becomes covered, increase the flow of the resinous juices until the nodule has attained a sufficient size; being hollowed out the meanwhile into the chambers above referred to, and the domicile completed in which the larva is to spend the remainder of its existence.

It was after having attained this stage that the larvæ under notice were first observed in the early days of May, 1888; they were still small, and showed little signs of growth until the end of that month; but from this time they grew rapidly, and by the end of June had the appearance of being full fed, in which condition they remained until the spring of 1889, the pupal stage being reached by the 20th April, and the imagines emerged between 25th May and 3rd June. During the time that the larva is in the nodule, it appears to reside in the outer of the two chambers, and to gain what sustenance it requires from the juices that ooze into its apartment from the tree.

Thus the time from the finding of the larvæ to the appearance of the imagines was some thirteen months, and it is evident that the larvæ when first noted, had already been feeding for some considerable time, and had indeed completed the earlier stages of their existence; there appears, therefore, to be no doubt that this species does occupy a period of two years in completing its metamorphoses.

Wellfield, Lingards Road, Lewisham, February, 1890.

RHOPALOCERA AT DIGNE.

BY MRS. NICHOLL.

THE butterflies of Switzerland are nearly as well known to British entomologists as those of our own island. Everybody goes to Switzerland, and many people catch butterflies during their holiday, and consequently the chance of finding a new variety, or a new locality for a species, is but very slight. This, however, is by no means the case in the South-eastern departments of France. Hautes Alpes, Basses Alpes, Isère, and Var, present a wide and little-explored field to the butterfly hunter, and if the district were thoroughly worked it is more than probable that new varieties, and even new species, might be found there. The country is very mountainous, and presents a great variety of geological formation, combined with a climate far warmer than that of Switzerland; and although the general character of the mountains is bare and stony, yet there remain many forests of birch, beech, oak, and pine, and many rich mountain pastures, where the flora is even more varied and beautiful than that of the Swiss Alps.

The inns of this country are generally reported to be exceedingly bad, but this is now no longer the case. Digne, Barcelonnette, and Briançon possess excellent hotels; and good clean mountain inns, affording excellent accommodation, are to be found at Ville Vallouise, Monetier, La Grave, and La Bérarde. So the entomologist need not fear any great discomfort if he should be tempted into a voyage of discovery into a country which is probably rather less known than Japan to the ordinary English tourist.

We arrived at Digne on June 10th last, and remained there until July 2nd. We then went to Seyne and Barcelonnette, returning to Digne on July 9th, and remaining there till July 17th. I append a list of the more remarkable insects which I took at Digne during these two periods. The weather was generally fine and hot after the first week we spent there; but the season was fully a fortnight late, owing to the cold and wet which had prevailed south of the Alps during the months of April and May. It was, however, too late for the greatest of the local rarities,—*Thais rumina*, var. *honoratii*,—one of the most striking and beautiful of European butterflies, for which the neighbourhood of Digne is the only known locality. I succeeded in purchasing one from a peasant farmer who collects and sells them to Staudinger; but the season had been a very bad one: he had but two left in stock, and my specimen cost 25 fr. I believe that in a good year they can be had for 10 fr. It was also too late for the local *Erebia epistygne*, which flies on the high limestone ridge of the Dourbes during March and April; but this is always plentiful.

Between June 9th and July 2nd I caught the following butterflies:—

Papilio alexanor.—Common all round the town.

Parnassius apollo.—Near the Baths; not plentiful.

Thais rumina, var. *medesicaste*.—Common at the Baths, and in a little gorge running up into the ridge of limestone rocks behind the town.

Euchloë belia, var. *ausonia*.—Common on the limestone ridges. *E. tagis*, var. *bellezina* (nearly over).—On the Dourbes.

Leucophasia sinapis, var. *lathyri*.—Generally common.

Thecla ilicis, vars. *cerri* and *æsculi*.—Common.

Lycæna iolas (nearly over).—Two only, near the Baths.

Erebia evias and *E. epistygne*.—On the Dourbes.

Cænonympha dorus.—Common.

Spilothyrus lavateræ.—Common.

Argynnis adippe, var. *cleodoxa*.—Common. *A. daphne*.—Common.

Between July 11th and 16th, at Digne, I took the following:—

Thecla roboris.—Plenty about the oak trees in the little gorge running into the back of the "town rocks," all, however, a good deal worn, and had evidently been out some days. This rare insect probably flies for a very short time, as it was certainly not on the wing before July 1st. I scarcely found any after July 12th.

Lycæna meleager.—Very common. *L. admetus*, var. *ripperti*.—Common on lavender blossoms.

Libythea celtis.—Not uncommon (partial to clematis).

Vanessa egea.—Plentiful.

Parnassius mnemosyne.—Common at the foot of the precipice of the Dourbes.

Satyrus circe and *S. briseis*.—Very common. *S. fidia*.—Just coming out on the last day I had at Digne.

Melanargia galatea, var. *leucomelas*.—One only.

Syrichthys carthami.—Common. *S. alveus*.—Common. I also took a remarkable var., I think of *S. alveus*, in which the under side of the hind wings is brilliant red-brown—a bright shade of burnt sienna.

Erebia ligea.—In the forest on the side of the Dourbes. *E. glacialis*, var. *pluto*.—On the Dourbes. Had I remained a few days longer I should have taken *E. scipio* in plenty on the Dourbes. I got a good series of this handsome insect a week later, in Dauphiné. *Melanargia iapygia*, var. *cleante* is common at Digne in the month of August.

Besides these butterflies I took a good many beautiful species of Heterocera, but these I have not yet named. I failed to find the rare *Clostera alpina*, which is frequently met with on poplar trunks near the town.

Merthyr Mawr, Bridgend, Glamorganshire.

ON THE PHYLOGENETIC SIGNIFICANCE OF THE WING-MARKINGS IN CERTAIN GENERA OF THE NYMPHALIDÆ.*

By F. A. DIXEY, M.A., F.E.S., &c.

THE varied markings exhibited by the members of the genus *Vanessa* and its immediate allies (including the Argynnidæ), can all be reduced to one simple type, consisting essentially of four series of dark spots running in a direction almost parallel to the outer borders of both fore and hind wings. This pattern in its simplest form is seen in the genus *Argynnis*, and in a more highly specialised and decorative condition in the genera *Pyrameis*, *Grapta*, and *Vanessa*. The earliest type now extant is, perhaps, furnished by the female of *Argynnis diana*, in which the primitive pattern of spots is beginning to be established by a lightening of the dark blue ground colour in certain areas of the wing. A derived form (*A. sagana*, female), in which some of the lighter shadings have become almost white, may represent a transition from the primitive speckled condition to that which is the rule in *Apatura* and *Limenitis*; while the female of *A. niphe*, taken in connection with *A. paphia*, var. *valesina*, and *Clothilda pantherata*, indicates the path along which the generalised system of coloration prevailing among the Argynnids has become transformed into the more specialised pattern of the highly ornamental Vanessas. The blue patches, occurring in the sub-marginal band or chain of spots in many of the Vanessidæ, are probably a relic of the original deep blue or green ground colour of the genus *Argynnis*, to which so many female Argynnids show a tendency to revert; the bright brown, salmon-coloured, or scarlet ground colour of Vanessids being derived from the fulvous tint generally belonging to the male Argynnids, and in a less degree to the females. From the "Protovanessa," or common ancestor of the genus *Vanessa* in the widest sense, three principal lines seem to have diverged; the first leading in the direction of the genus *Pyrameis*; the second towards the interesting genus *Araschnia*; the third through the genus *Grapta* to *V. polychloros*, *V. urticae*, *V. milberti*, &c. The genus *Eurema* would seem to be an offshoot from the first of these stems; the two species, *V. io* and *V. antiopa*, from the last. Special attention was drawn to the rudimentary ocellus in the hind wing of *V. io*, as indicating that the large ocellus nearer the costa was mainly formed out of three members of a series of blue-centred black spots, well marked in *P. gonerilla*, *P. itea*, and many other species closely allied to *P. cardui*; this conclusion being strengthened by the condition of the ocellus in a variety of *V. io*, figured in the 'Entomologist,' vol. xxii. Pl. viii. fig. 8.

* Epitome of a paper read before the Entomological Society, London, Feb. 5, 1890.

NEW SPECIES OF LEPIDOPTERA FROM CHINA.

By J. H. LEECH, B.A., F.Z.S., &c.

(Continued from p. 50.)

HEMARIS STAUDINGERI, sp. n.

All the wings hyaline; primaries with black base, costa and inner margin, the latter tapering towards outer angle; outer margin brownish black, broader towards the apex, and encroaching into each internervular space. Secondaries with a broad, black, inner margin, and narrow outer border. Thorax olive-brown; patagia tinged with reddish; body black, segments 11 to 13, reddish orange; anal tuft black. Under surface as above, but head, pectus and anterior legs yellowish white, and the 11th and 12th segments of body bordered with yellow. Expanse: male, 58 mm.; female, 66 mm.

Five males and one female taken at Chang Yang in July.

Allied to *Hemaris alternata*, Butl., but the borders of all the wings are narrower, and black instead of brown; the patch at base of secondaries is also black.

PHAUDA PRATTI, sp. n.

♂. Primaries golden-orange, suffused with dusky about the disc and outer margins, and pale at apex, where also the fringes are whitish. Secondaries subhyaline, outer half blackish; inner margins clothed with reddish orange hairs; fringes black; body black, clothed about base with reddish orange hairs. Under surface as above; pectus, abdomen and legs golden-orange. Expanse, 29 mm.

One male taken near Ichang in July.

Allied to *Phauda fortunei*, H.-S., but at once separated by the absence of black apical patch on primaries.

TEGULATA FIMBRIATA, sp. n.

Primaries pale cinnamon-brown, clouded with darker across the discal area; a broad blackish spot, set in a pale grey patch, on costa near base, and a small colon-like mark beyond; the subcostal nervure is deeply fringed with greyish silky hairs. Secondaries pale brown, darker towards outer margin. Under surface of primaries fuliginous-brown, costa tinged with yellowish; secondaries pale yellowish brown, with an obscure dark ante-marginal band. Expanse, 32 mm.

One specimen taken in July at Chang Yang.

Allied to *Tegulata protuberans*, Moore, from Darjeeling.

KATHA MOOREI, sp. n.

♂. Primaries pearly grey, darker along the costa and outer third of the wing. Secondaries yellowish buff. Head, thorax, body and antennae dark pearly grey. Under surface as above, but rather fainter. Expanse, 42 mm.

One male taken at Chang Yang in June.

LITHOSIA LENTA, sp. n.

♂. Primaries uniform pearly grey, silky, and slightly tinged with yellow along the costa. Secondaries rather paler, especially towards the costa. Head yellow, thorax and body pearly grey, anal tuft yellow. Under surface as above, but rather paler. Expanse, 22 mm.

Two males, one taken at Chang Yang in June, the other near Ichang in July.

LITHOSIA COSTIPUNCTA, sp. n.

♂. Ground colour of primaries rich orange, with a round black spot just below middle of costa. Secondaries rather paler. Under surface the same as above, but slightly paler and with no indication of the black costal spot; legs blackish. Expanse, 37 mm.

One male taken at Chang Yang in June.

SETINA UNIPUNCTA, sp. n.

♂. Primaries yellow, costa inclined to orange, costal spot black and distinct. Secondaries paler. Under surface of primaries fuliginous, all the margins yellow, as also is the discoidal cell, central spot indistinct; secondaries as above, but costa deeper yellow. Head and thorax colour of primaries; abdomen paler, tinged with grey towards anal segment, which is yellow.

♀. Primaries reddish orange, the discal area suffused with yellowish, black central spot. Secondaries pinkish red. Under surface as in the male, but the yellow is replaced by red. Expanse: male, 34 mm.; female, 38 mm.

Two specimens taken at Chang Yang (female in May; male in June).

SETINA RUBRICANS, sp. n.

Primaries rosy-buff; costa black at base; discal spot large, black, a smaller one below on the inner margin; there is also a submarginal series of small black spots. Secondaries paler, rather darker along outer margin. Under surface: primaries suffused with black along the centre of the wing and basal portion of costa; secondaries with a marginal row of five small black spots; legs marked with black. Expanse: male, 30 mm.; female, 34 mm.

A nice series taken at Chang Yang, in June; also specimens from the neighbourhood of Ichang, in July. There is an unnamed specimen from Pekin in the National Collection at South Kensington, which I believe is referable to this species.

MILTOCHRISTA RIVALIS, sp. n.

Closely allied to *M. inscripta*, Walk., but smaller, and the discal area of primaries much whiter; there is a black dot at the base and a pink streak above on the costa, but no other black marks before the first line, which is distinctly curved. Expanse: male 22 mm.; female, 27 mm.

Several specimens taken at Chang Yang in June, and at Ichang in July; also one female example taken by my native collector at Gensan in July, 1887, which at first I thought was probably a variety of *M. inscripta*. The differences referred to are constant.

MILTOCHRISTA RUFA, sp. n.

Primaries reddish orange; basal and outer thirds blackish, the external edge of former oblique and internal edge of the latter curved, meeting on the inner margin. Secondaries orange-yellow, outer margin bordered with blackish. Fringes reddish orange. Under surface orange-yellow; base of costa and border of outer margin of primaries blackish, as also is the narrower outer border of secondaries; fringes as above. Head and thorax orange-yellow; abdomen rather darker. Expanse, 24—27 mm.

Six specimens taken in June at Chang Yang.

PENTACITROTUS AENEUS, sp. n.

♂. Primaries cupreous-yellow; two transverse black angulated bands, with metallic-blue spots, are united by a longitudinal streak from one to the other above the middle; there is also a black streak on inner margin from base to first band; beyond second band is a small black spot, and the apex has a narrow black border in which are some metallic-blue dots. Secondaries yellow, with two large black spots before the outer margin. Under surface yellow; markings as above, but there are no blue spots on primaries. Expanse, 27 mm.

One male example taken in June at Chang Yang.

A female specimen of this species, from Darjeeling, in the National Museum at South Kensington, has the bands on the primaries interrupted.

HYLOPHILA MAGNIFICA, sp. n.

♂. Primaries rosy, suffused with brownish about the disc and basal portion of costa; the cell and basal portion below it bright mossy green; a broad submarginal band of green, dark along its inner margin, and traversed by a whitish line from apex to inner margin. Secondaries pale golden-brown; neurulation and fringes rosy. Abdomen light golden-brown. Under surface as above, but fainter. Head and thorax moss-green, streaked with rosy; legs rosy; antennae rosy above, brownish beneath. Expanse, 34 mm.

One male of this lovely species taken at Chang Yang in May.

SETORA DIVISA, sp. n.

♂. Primaries: basal two-thirds dark chocolate-brown; outer third paler; outer line chocolate-brown, and a few dashes of the same colour along the outer margin; a dark line precedes the fringes, which are intersected by a pale line; discoidal spot black. Secondaries fuscous-brown, with a pale marginal line; fringes intersected by a pale line. Under surface uniform fuscous-brown, with a pale marginal line. Expanse, 26 mm.

One male taken at Chang Yang in June.

HETEROGENEA OBLIQUA, sp. n.

♂. Primaries yellowish-buff, sprinkled with reddish-brown scales; a straight dark brown line runs from apex to near the base of inner margin; there is also a narrower, dark brown, submarginal line. Secondaries fuscous-grey, with silky reflections. Head and thorax yellowish buff; body rather darker. Under surface yellowish, sprinkled with darker scales. Expanse, 30 mm.

One male taken at Chang Yang in July.

ATOSSA NELCYMNA.

Atossa nelcymna, Moore, Proc. Zool. Soc. 1874, p. 577, pl. lxvii., fig. 7,

Calcosia palæarctica, Staud., Rom. Mém. Lep. iii. p. 192, pl. xi. fig. 3, 1887.

Var. *chinensis*.

♀. In this form the neurulation is broadly bordered with blackish; the outer third of all the wings is much suffused with the same colour, and sprinkled with greenish grey scales. Expanse, 79 mm.

I received one female taken at Chang Yang in June.

(To be continued.)

DESCRIPTIONS OF NEW SPECIES OF PHYTOPHAGOUS
COLEOPTERA RECEIVED BY MR. J. H. LEECH, FROM
CHANG-YANG, CHINA.

By MARTIN JACOBY, F.E.S.

DONACIA LONGICORNIS, n. sp. (Plate I. fig. 2).

Subdepressed, obscure greenish or brownish cupreous; antennæ as long as the body (♂); thorax constricted at the base, the sides tuberculate anteriorly, the surface transversely strigose; elytra punctate-striate, the interstices transversely wrinkled, the apex truncate.

♂. The posterior femora extending much beyond the elytra, with a stout tooth, their tibiae curved, finely dentate at the inner margin, triangularly toothed below the middle. ♀. Antennæ shorter; femora not produced beyond the elytra, obsoletely toothed, their tibiae simple, unarmed. Length, $4\frac{1}{2}$ —5 lines.

♂. Head minutely rugose, with a deep central groove between the antennæ; eyes rather small; palpi and mandibles piceous; antennæ as long or longer than the body, black, very finely pubescent, the third joint distinctly longer than the fourth and the longest; thorax slightly longer than broad, the anterior portion much widened and swollen in shape of rounded tubercles at the sides, the anterior angles also distinctly tuberculiform, the surface flattened with a central longitudinal groove, entirely and closely transversely strigose without punctuation; scutellum clothed with fine greenish pubescence; elytra flattened, their apex truncate, the surface transversely rugose or wrinkled, the punctured striæ placed at regular intervals, the punctures rounded at the base, more elongate towards the middle, and distinct to the apex; the underside metallic, clothed with very short yellowish pubescence.

A few specimens.

This *Donacia* will not be very difficult to recognize on account of the long and slender antennæ, the long posterior femora and dentate tibiae of the male insect; the female differs considerably in this, but in no other respect; the strongly swollen anterior portion of the thorax will further assist in the recognition of the species.

CHALCOLEMA, n. gen. (CRIO CERIDÆ ?)

Body elongate; eyes small, entire; antennæ widely separated, filiform, the first and second joints short, the others elongate; thorax subquadrate, the lateral margin distinct, the disc flattened, foveolate; scutellum not longer than broad, its apex broadly truncate; elytra irregularly punctured, sparingly pubescent, their epipleuræ narrow; legs moderate, the femora thickened, the posterior ones more strongly incrassate; the first joint of the posterior tarsi as long as the two following ones together; claws appendiculate; prosternum broad, slightly longer than broad; mesosternum constricted at the middle; the first abdominal segment double the length of the second one.

The species, for the reception of which I propose the present genus, and of which only a single specimen was received, seems to form a most interesting link between the *Sagridæ* and *Crioceridæ* on one hand, and the *Megascelidæ* on the other. I cannot at present, however, give an opinion on its true systematic position, since the insect seems to unite characters to be found singly

in several tribes, and divided amongst their respective genera; thus, *Chalcolema* has the head and antennæ of a *Megascelis*, a thorax peculiar to itself on account of a distinct lateral margin and its general shape, while the proportionate length of the abdominal segments resemble those of the *Crioceridæ*, as well as its general elongate shape and narrow elytral epipleuræ; the appendiculate claws, however, again separate it from the last-named tribe.

Type, *Chalcolema foveicollis*.

CHALCOLEMA FOVEICOLLIS, n. sp. (Plate I. fig. 1).

Black; the head, thorax, and legs fulvous; elytra metallic dark blue; thorax remotely punctured, deeply foveolate at the sides; elytra closely and strongly punctured, finely pubescent. Length, $4\frac{1}{2}$ lines.

Head swollen at the vertex, strongly but remotely punctured, with a central longitudinal groove; clypeus wedge-shaped, deflexed, its surface concave, its anterior margin emarginate, obliquely angulate at the sides; labrum transverse, deeply concave at its anterior margin; mandibles very robust and thickened; palpi filiform, black, the terminal joint longer than broad, pointed; antennæ more than half the length of the body, black, the basal joint obscure fulvous below, short and thickened, the second slightly shorter and less stout, the others elongate and slender, nearly equal in length, the terminal joint with a short and pointed appendage; thorax slightly broader than long, the base somewhat narrower, the anterior angles tuberculiform, the surface very remotely but distinctly punctured, fulvous, shining, with a deep longitudinal fovea near the lateral margin, and a larger and more rounded one at each side near the base; scutellum black, shining; elytra elongate, slightly constricted at the middle, the shoulders prominent and acute, bounded inwards by a deep longitudinal depression, the disc closely impressed with smaller and larger punctures, the interstices somewhat transversely rugose (especially near the suture), and sparingly clothed with short pubescence; underside black, shining, the coxæ, legs, and the prosternum fulvous; tibiæ clothed with yellowish pubescence.

LEMA CHINENSIS, n. sp.

Black; the base of the head, thorax and elytra fulvous; thorax impunctate; elytra with a sutural depression, strongly punctate-striate; abdomen and the middle of the breast, fulvous. Length, 2— $2\frac{1}{2}$ lines.

Head black, the base and two rather strongly raised tubercles between the eyes fulvous; eyes deeply indented, the lateral grooves deep, the lower portion of the face sparingly clothed with yellow pubescent; antennæ rather short and robust, entirely black, the fourth joint slightly longer than the third; thorax not longer than broad, the sides rather deeply constricted, the basal sulcation distinct, placed at some distance from the base, the anterior angles with a minute tubercle bearing a single hair, the surface impunctate; scutellum fulvous; elytra with a distinct sutural depression below the base, regularly and rather deeply punctate-striate, the interstices at the sides and at the apex, costate; underside clothed with fine yellow pubescence.

The entirely black antennæ, colour of the head and the two tubercles of the latter, as well as the fulvous abdomen, separate *L. chinensis* from its Asiatic congeners; the amount of fulvous of the breast is somewhat variable. The species seems allied to *L. russula*, Bohem. (*bohemani*, Clark), but differs in its coloration.

A few specimens.

TEMNASPIS HUMERALIS, n. sp. (Plate I. fig. 3).

Black, sparingly pubescent; thorax impunctate, with a tubercle at the posterior angles; elytra flavous, finely punctured, the shoulders with a black spot; abdomen and a spot on the posterior femora, flavous. Length, 5 lines.

Head broad, impunctate, black, with a deep fovea between the eyes; antennæ scarcely extending beyond the base of the thorax, black, the four basal joints shining, the rest opaque, transversely widened; thorax deeply transversely sulcate behind the anterior margin, with an acute lateral tubercle near the base, the surface smooth, shining, black, furnished with single erect black hairs; scutellum black, its apex slightly emarginate; elytra finely and not very closely punctured and sparingly clothed with black hairs, flavous, with a black spot placed on the humeral callus; underside and legs black, the metasternum with two triangular raised elevations; abdomen flavous; the posterior femora with an acute tooth near the apex, the latter flavous.

A single specimen.

GYNANDROPHALMA LEVICOLLIS, n. sp.

Black; the head, thorax, scutellum and legs fulvous; elytra black; thorax impunctate, elytra closely punctured. Length, $1\frac{1}{2}$ lines.

Head smooth, impunctate; antennæ black, the lower four joints fulvous; thorax two and a half times broader than long, the sides rounded, widened towards the base, very narrowly margined, the surface impunctate fulvous, the posterior margin slightly produced and broadly rounded at the middle; scutellum broad, strongly pointed at the apex, the surface fulvous, impunctate; elytra parallel, black, closely punctured, the punctuation somewhat regularly arranged in rows, the lateral margin but slightly produced below the shoulders; under side black (with the exception of the anterior portion of the breast), finely clothed with greyish hairs; legs fulvous; the first joint of the posterior tarsi scarcely as long as the two following joints together.

Of this species, principally distinguished from its congeners by the fulvous head and the black elytra, many specimens were obtained.

GYNANDROPHALMA FULVEOLA, n. sp.

Entirely pale fulvous; apical joints of the antennæ fuscous; head and thorax impunctate; elytra finely and subregularly punctured, the apex nearly impunctate. Length, $1\frac{1}{2}$ line.

Head with a rather deep rounded fovea between the eyes, impunctate, the anterior margin of the epistome deeply concave-emarginate; labrum more or less black; antennæ not extending beyond the thorax, the lower four joints fulvous, the rest nearly black; thorax transverse, more than twice as broad as long in the male, the sides strongly rounded and widened at the base, the basal lobe scarcely produced, the surface entirely impunctate; scutellum triangular, acutely pointed; elytra moderately closely but finely punctured, the punctures semi-regularly arranged in rows, gradually diminishing towards the apex, the latter nearly impunctate; under side and legs fulvous, finely pubescent.

Many specimens.

G. fulveola may be known by the entirely unicolorous fulvous colour, the impunctate head and thorax in connection with its small size.

CRYPTOCEPHALUS RECTIPENNIS, n. sp.

Metallic dark blue; the basal joints of the antennæ and the anterior femora fulvous; thorax rather closely punctured; elytra strongly punctate-striate, the interstices more or less convex.

♂. The lower portion of the head and the anterior angles of the thorax flavous; the elytral interstices rather convex and somewhat rugose. ♀. The head and thorax unicolorous dark blue, the latter closely strigose-punctate. Length, $\frac{3}{4}$ — $1\frac{1}{4}$ line.

♂. Head with a few punctures, the vertex piceous, this colour projecting into three points into the flavous portion of the lower part of the head; eyes not deeply emarginate; palpi piceous; antennæ half the length of the body, the five or six lower joints flavous, the rest fuscous, the third joint scarcely longer than the second one; thorax strongly transverse, the sides rather rounded at the middle, the angles acutely pointed, the disc with a more or less distinct transverse depression at each side, rather closely impressed with elongate punctures, which are more numerous at the sides than at the disc; scutellum black, slightly raised; elytra without distinct lateral lobe, rather flattened, strongly punctate-striate, the interstices convex at the sides and somewhat rugose, the shoulders raised, narrow; under side and legs nearly black, the four anterior femora and the prosternum fulvous.

This small species, of which several specimens are contained in this collection, seems allied to *C. pumilio*, Suffr., but is, I think, distinct from that species; its colour is not blackish green but dark blue: the thorax has closely placed and elongate punctures, which in the female insect almost occupy the entire sides, forming strigæ; the sculpture of the elytra also differs apparently from *C. pumilio*, as the interstices are distinctly raised at the sides in *C. rectipennis* and irregularly wrinkled.

CRYPTOCEPHALUS NIGROLIMBATUS, n. sp. (Plate I., fig. 6.)

Below black, above pale flavous; antennæ black, the basal four joints fulvous; thorax impunctate; elytra strongly punctate-striate, narrowly margined with black; legs fulvous. Length, $1\frac{1}{2}$ —2 lines.

Head impunctate, shining, flavous; eyes moderately deeply notched; epistome separated from the face by a deep oblique groove; antennæ two-thirds the length of the body, the basal four joints fulvous, the rest black; thorax narrowly transverse, the sides slightly rounded, very narrowly margined, the surface entirely impunctate, shining, flavous, the extreme basal margin black; scutellum flavous, margined with black; elytra deeply punctate-striate, the punctures visible to the apex but finer, the interstices smooth, scarcely raised, flavous, the extreme sutural and lateral margins, and the epipleuræ partly, black; pygidium flavous; under side black, prosternum flavous; the last abdominal segment in the female flavous, with a deep oblong fovea.

The black under side and similarly coloured narrow elytral margins distinguish *C. nigrolimbatus* from *C. pini*, *C. hecticus*, Fab., and other unicolorous species: the female specimens are considerably larger than the male, but do not differ in any important way.

A small number of specimens.

CRYPTOCEPHALUS NASUTULUS, Weise.

Several specimens agreeing closely with the author's description were obtained. I must, however, add that the thorax in all

is moderately closely and distinctly punctured (Weise calls the punctuation obscure), and that there is a lateral depression distinctly visible in the female, less so in the male, at each side; *C. nasutulus* is allied to *C. fortunatus*, *C. approximatus*, Baly, *C. kulibini*, Gebl., and *C. splendens*, Kraatz.

CRYPTOCEPHALUS FESTIVUS, n. sp. (Plate I., fig. 4.)

Flavous; the terminal joints of the antennæ and the middle of the breast and abdomen black; thorax impunctate; elytra violaceous-blue, strongly punctate-striate, the interspaces smooth, the lateral margin anteriorly flavous. Length, $1\frac{1}{2}$ —2 lines.

Head nearly impunctate, flavous, the extreme vertex blackish with a few fine punctures; antennæ long and slender, two-thirds the length of the body, the lower four joints flavous, the rest black; thorax transverse, strongly narrowed in front, the sides but moderately deflexed with a narrow margin, the lateral margin nearly straight, the surface entirely impunctate, flavous; scutellum black, slightly longer than broad, its apex truncate; elytra regularly and strongly punctate-striate, the punctures distinct to the apex, metallic violaceous, the interstices flat and impunctate, the anterior margin and the epipleuræ at the base flavous; pygidium, under side and legs pale flavous, the centre of the lower portion of the breast and of the abdomen black, the apex of the last abdominal segment in the male slightly emarginate at the middle, that of the female with the usual deep fovea.

I am not acquainted with any eastern *Cryptocephalus* agreeing in coloration with the present insect, of which a dozen specimens were received; the flavous colour of the lateral margin and of the epipleuræ extends to the middle of the elytra.

CRYPTOCEPHALUS FLAVOPICTUS, n. sp. (Plate I., fig. 5.)

Black, finely pubescent; three spots at the head, the anterior and lateral margin of the thorax, and two basal spots (sometimes absent) of the latter, flavous; thorax closely punctured; elytra strongly punctured, flavous, the suture and two transverse narrow bands connected with a lateral longitudinal stripe, black; legs fulvous. Length, 2 lines.

Head rather closely punctured, finely pubescent, longitudinally depressed at the vertex, black, two spots above the eyes and the epistome bright flavous; antennæ two-thirds the length of the body, the lower five joints fulvous, the others black; thorax subcylindrical, much narrowed in front, the sides strongly deflexed, the lateral margins nearly straight, the surface closely and finely punctured and pubescent, black, the anterior and lateral margins flavous (the former narrowly widened at the middle, the latter widened at the angles); scutellum scarcely raised, slightly longer than broad, its apex truncate, black; elytra sparingly clothed with short yellow pubescence, closely and strongly punctate-striate, flavous, with a narrow black transverse sinuate band before and another below the middle connected with the black suture, and a similarly coloured stripe running parallel to the lateral margin,—this latter band does not extend to the apex; pygidium black, its lower edge flavous; the under side black, the anterior coxæ and the legs fulvous, the femora pale flavous at their apex.

C. flavopictus resembles much in its coloration *C. pustulatus*, Ross, and allied forms, but differs in the finely pubescent upper surface, and in the close and somewhat elongate punctuation of the thorax; the two basal spots in front of the scutellum are frequently absent; the elytra in the male insect show deep rows

of punctures with more finely punctured interstices, while these latter in the female are as deeply punctured as the rest of the punctures; the flavous colour of the elytra forms three spots on each, placed one at the base, the second at the middle, and the third at the apex; the lateral black stripe is rounded in front of each of the flavous spots.

Several specimens.

CRYPTOCEPHALUS DISCOIDALIS, n. sp.

Black; the head (the vertex excepted), the sides of the thorax and the anterior femora fulvous; thorax impunctate; elytra violaceous-blue, strongly punctate-striate. Length, $1\frac{1}{2}$ line.

Head impunctate, obscure fulvous, the vertex piceous; labrum black; the lower five joints of the antennæ fulvous, the basal joint piceous above, the others black; thorax short, nearly three times broader than long, the lateral margins very slightly rounded, the angles acute, the surface smooth and shining, fulvous with a discoidal lozenge-shaped black spot from the base to the apex; scutellum raised, black; elytra dark blue, regularly punctate-striate, the punctures diminishing in depth towards the apex, the interstices somewhat rugose at the sides, the shoulders prominent, sub-tuberculiform; pygidium and under side black; anterior femora and the prosternum fulvous, the latter ending into a sharp point at each side.

The above description is that of the female insect; a single male now before me has a rather deep longitudinal and punctured depression at the vertex, and the thorax is nearly entirely black, the sides being broadly and the anterior margin narrowly flavous; the punctuation of the elytra is rather more strongly impressed. This small *Cryptocephalus* resembles certain varieties of *C. albo-scutellatus*, Suffr., but differs in the flavous anterior femora, the stronger elytral punctuation, and in the shape of the prosternum.

DIORYCTUS NIGRIPENNIS, n. sp.

Fulvous; the terminal joints of the antennæ piceous; head finely punctured; thorax impunctate; elytra black, finely punctate-striate. Length, 2 lines.

Broadly subquadrate, robust; the head rather closely and very finely punctured, fulvous; eyes broadly and subangulate emarginate; antennæ short, the lower five joints fulvous, the others fuscous slightly widened; thorax strongly narrowed in front, the sides evenly rounded and very narrowly margined, the posterior angles acute, the posterior margin slightly sinuate and produced into a point at the middle, the surface not visibly punctured, fulvous, shining, the extreme basal margin black; scutellum not visible; elytra broadly subquadrate, their apex broadly rounded, the basal lobe obliquely produced at the middle, the disc with ten rows of fine punctures, black, the interstices flat and impunctate; under side and legs fulvous; prosternum much broader than long; the anterior margin produced into a distinct tooth at the middle, the posterior margin concave at each side.

Hab. China (coll. Jacoby).

A single specimen of this proportionately large-sized species is contained in my collection from China without precise locality.

(To be continued.)

DESCRIPTIONS OF CHINESE SPECIES OF THE HOMOPTEROUS FAMILY CICADIDÆ.

By W. L. DISTANT.

I AM indebted to the kindness of Mr. J. H. Leech for a small but very interesting collection of Rhynchota made by his collector in China. This collection proved most opportune material for my Monograph of the Eastern Cicadidæ, as although I had examined most of the large Continental collections, and amassed considerable material myself, the Cicadidæ of China were, and still remain, a subject of much conjecture. The three species here described add to our scanty knowledge, and will be subsequently figured in another publication. The remaining portions of the collection I hope to describe shortly in the pages of this Magazine.

CICADA LEECHI, n. sp.

Head black; the eyes, apex and base of front, and a triangular spot on anterior margin of vertex, greenish ochraceous. Pronotum castaneous; the anterior, posterior and lateral margins, a narrow central longitudinal fascia, and two small basal spots, ochraceous; these ochraceous margins and spots more or less edged with black, the posterior margin crossed by three black bands—one central and one near each lateral angle. Mesonotum black, with two broken linear ochraceous obconical basal spots, the lateral margins and the basal cruciform elevation—excluding centre and apices—also ochraceous. Abdomen black, with two slightly oblique white macular fasciæ on each lateral area; outer margins of the tympanal coverings ochraceous. Body beneath, legs and opercula dull ochraceous, the sternum greyishly pilose; the lateral striations to face, the outer margins of coxæ, inner margins of anterior and intermediate femora, and the extreme apices of tibiæ and tarsi black. Tegmina and wings pale hyaline, the venation pitchy; tegmina with the costal membrane pale greenish, the transverse veins at the bases of the second and third apical areas broadly infuscated, and those at the bases of the fifth and seventh areas narrowly infuscated; the bases of the wings narrowly pale greenish. The opercula are long,—about extending to two-thirds the length of the abdomen,—overlapping internally, their outer margins moderately concave, their inner margins slightly convex, their apices angularly rounded. Long. excl. tegm., ♂, 38 mm. Exp. tegm., 105 to 110 mm.

Hab. China; Wa Shan and Chia Kou Ho.

This species is allied to the Japanese *C. bihamata*, Motsch., but differs by the larger size, the different markings of the body, and the totally different structure of the opercula, which in Motschulsky's species are widely divergent, and not overlapping as in *C. leechi*.

CICADA SINENSIS, n. sp.

Head and pronotum greenish ochraceous; head with a broad black fascia between the eyes; pronotum with two short narrow discal black fasciæ near anterior margin and a black band across the posterior margin near each lateral area. Mesonotum castaneous, with a central tri-lanceolate greenish ochraceous spot with the surrounding area black, a lateral black fascia on each side outwardly margined with greenish ochraceous, the centre and apices of the

basal cruciform elevation black. Abdomen black, with two longitudinal and slightly oblique macular white fasciæ on each lateral area; outer margins of the tympanal coverings ochraceous. Body beneath pale ochraceous, thickly clothed with greyish pile; legs greenish ochraceous. Tegmina and wings pale hyaline, the venation greenish inwardly, fuscous outwardly; tegmina with the costal membrane ochraceous and its outer margin pale sanguineous, the transverse veins at the bases of the second and third apical areas infuscated; extreme bases of the tegmina and wings pale sanguineous. The opercula are short, not extending beyond the basal segment of the abdomen, convexly rounded externally, and slightly overlapping at their inner margins. Long. excl. tegm., ♂ and ♀, 29 to 32 mm. Exp. tegm., 80 to 85 mm.

Hab. China; Chia Kou Ho.

KARENIA CÆLATATA, n. sp.

♀. Head, pronotum and mesonotum pale greenish, sparingly pilose; head with the area of the ocelli, and a spot on each side of base of front, black; eyes brownish ochraceous. Pronotum with two central discal curved fasciæ, which are united posteriorly, and a spot on the lateral margins, black. Mesonotum with two central obconical spots at anterior margin, on each side of which is a larger angulated spot, and a rounded spot at each anterior angle of the basal cruciform elevation, black (these spots are more or less effaced in the typical specimen described); base of the cruciform elevation, a small spot on each side of it, and a spot on each side of the basal margin of the metanotum, black. Abdomen ochraceous, strongly pilose, with three irregular longitudinal fuscous fasciæ,—the central one broadest, those on the lateral areas much angulated and macular. Body beneath and legs greenish ochraceous; a spot at base of antennæ, posterior margin of face, a spot near bases and apices of femora, bases of tibiæ, tarsal claws, and the base and apex of abdomen, more or less black. Tegmina and wings pale hyaline, the venation more or less fuscous; tegmina with the costal membrane greenish, its extreme margin black, the transverse veins at the bases of the second, third, fourth, fifth and seventh apical areas broadly infuscated, and a series of fuscous marginal spots placed on the apices of the longitudinal veins to apical areas; extreme bases of the tegmina and wings ochraceous. Long. excl. tegm., ♀, 80 mm. Exp. tegm., 100 mm.

Hab. China; Chia Kou Ho. 1700 feet. July.

Although I possess but a single *female* specimen of this species, it seems to clearly belong to the genus *Karenia* which I proposed for the reception of a Burmese species some time since. The peculiar structure of the cruciform elevation at the base of the mesonotum, the ulnar vein emitted at extreme apex of basal cell of tegmina, the narrowed head, and short and robust abdomen, all show its generic position, though of course the male structure of the tympana is at present unknown.

NOTES ON HYBOCAMPA MILHAUSERI.

By T. A. CHAPMAN, M.D.

Among my earliest entomological ambitions was a desire to become acquainted with this insect, my interest being, I think, excited by Sepp's figure of the larva, and the vernacular name which he gives it, the "Dragon." It is now possible to purchase

the insect alive, and I have thus been enabled to learn something of it, and I find it so remarkable in several particulars as to much more than justify my curiosity. It is not really closely related to any of our *Notodontas*, but is nearest to the *Ceruras*, with a suspicion of true *Notodonta* (*N. ziczac* and *N. dromedarius*). The egg is large, clay coloured and beautifully zoned, with a dull terra-cotta like surface, apparently free from any structural lines or markings,—really the structure is so much finer than in *Cerura*, that a much higher power is needed to show it,—of a form not very different from that of *C. vinula*. The egg of *C. erminea* is so different from that of *vinula*, that it is, perhaps, not safe to say that that of *H. milhauseri* is not also of a *Cerura* pattern.

By the way, I was struck with the accurate knowledge which Sepp had, 100 years ago, of *Cerura* eggs; describing the brown eggs of *vinula* and *bifida* laid in pairs (or more) on the upper sides of the leaves; whilst *furcula* (and *bicuspis*) are black, and laid solitarily on the under surface of the leaves.

The young larva has grand lateral horns in front and a dorsal row; as he grows older the lateral ones disappear, whilst the dorsal ones remain, though proportionately smaller. I do not propose to describe the larva, which is of course well known, and to which no description without a figure can do justice; but till I saw it alive I could not understand why any larva should have such remarkable angular outlines, curiously conspicuous corners and humps. What the dark young larva resembles I have not ascertained, but by chance I one day brought in with their food so exact a resemblance of the full-grown larva, that there could not be any doubt as to the meaning of all its curious outlines and markings. This was a curled oak leaf, eaten and abandoned by a *Tortrix* (*viridana*?) larva.

This particular leaf was in detail exactly imitated by the larva of *H. milhauseri*. There was a curled portion of leaf with the outline of the body of the larva, the netted green texture of the leaf like the small markings on the surface of the larva, a brown decayed mark or two like the larva has; the extremity was eaten off on lines following partly a rib, so as to imitate the truncate aspect the larva has, however viewed; whilst the secondary ribs of the leaf, being eaten between, projected laterally from the roll just like the dorsal spines of the larva, and in about the same size and order; the tall one in the 5th segment; the dwindling ones in the 6th to 10th; and the taller bifid one on the 12th; this one resembling points from both edges of the leaf. Most curious, perhaps, of all, the little backward projecting points at the tips of the spines (or humps), apparently so superfluously complicated in the larva, were exactly represented in the leaf; the *Tortrix* larva, in eating the substance of the leaf between the secondary ribs, had eaten these down to some extent

also, but stuck fast just at a tertiary branch, the small remaining portion of which precisely represented the backward process of the larval spine. I never met with another rolled leaf that happened in exact number, size, and position, to represent all the processes of the larva as this one did, but any rolled and abandoned leaf bore a very close resemblance to the larva.

The cocoon is the most *Cerura*-like phase of this insect; it is made on the bark of the tree; though rather rounder and not quite so flat, it is in favourable specimens very like a *Cerura* in a similar locality. It differs, however, in several particulars. In its construction the larva first makes a silken net over itself at the site of the cocoon; this is so open and flimsy looking, and so close down on the larva, which is rolled together under it, that it is surprising how the larva can move about inside to continue the work, and how in doing so it does not tear all to pieces. *Cerura*, on the other hand (I have watched *bifida* and *bicuspis*), selects a place for its cocoon, and begins at what will be the tail of the cocoon by making what looks like its head, a little structure like the toe of a slipper; it pushes this end forward, working beneath it by loosening its attachments in front, and pushing its head under, spinning a continuation of it; in this way it gets under and detaches from the surface any bits of lichen and loose fragments of bark, which thus adhere in precisely their natural positions to the surface of the cocoon, and so much help its concealment; and having in this way pushed the front of the cocoon forward to its place, it closes the hinder end, and begins the excavating process by which it obtains the materials to form the outer part of the cocoon of a sort of artificial bark. *H. milhauseri* gets to the surface of the cocoon some colouring matters or lichenous material from the surface of the bark, and puts a little detached material round the margin of the cocoon to make it fit a little; but the face of the cocoon, instead of being like that of *Cerura*, an artificial bark, is almost pure silk of a dense gummy substance, such as I have seen *vinula* make under difficulties when he could get no wood to work with. *Milhauseri* only slightly smooths the bark beneath the cocoon, and covers it with gummy silk. *Cerura* lies in a neatly excavated cavity in the bark with practically no silken lining. Partly by its original close structure, and partly by contraction as it matures, this cocoon fits the pupa more closely than any other cocoon I have met with, so that, combined with its dense horny texture, it is extremely difficult to open it without injuring the contained pupa.

This close fitting of the cocoon to the pupa is related to perhaps the most curious of all the facts I have observed in this species, that is, its method of emergence; which is, I think, perhaps the most remarkable of any of the many remarkable provisions in different Lepidoptera for the escape of the moth from its cocoon.

As the shortest way of describing this process, I will call it cutting out a lid with a sardine opener. *Cerura* bursts an irregular lid, having first softened the place with some fluid, and in many instances the broken lid falls back for a time into its place; the lid is irregular in form, often in several pieces, just as accident decides; but *milhauseri* marks out with his sardine-opener an exact definite lid, of which there is no trace or indication in the construction of the cocoon, and continues cutting on this exact line until the lid is set free. This lid is of oval shape, but with the anterior margin more rounded than the posterior. There is something more to be learnt about the action of this sardine-opener than I have yet ascertained, but I can give a few more particulars. First, as to the implement itself. In the pupa, just in front of the eyes and between the bases of the antennæ, is a deep pit, having at the bases of the antennæ, on either side, a sharp margin, almost a horn; stretching up from below, from the mouth region towards the pit, is a flat surface slightly furrowed and wrinkled, and terminating at the front margin of the deep pit (though one would say at first sight in the middle of it), in a straight spine projecting well beyond the general surface of the pupa, sharply pointed and polished; a slight ridge stretches back from the spine through the pit, and fades out on to the surface of the pupa, so that the pit might be described as a double furrow, stretching from before backwards. This spine is the sardine-opener, and by a lateral rotatory movement of the pupa, which obtains its fulcrum from the tightness with which it is grasped by the cocoon, it traverses over and over again the outlines of the lid till it is cut through.

I have not seen this operation performed, for the reason that when you attempt to see it you stop it; but I have caught the creature actually at work, and can add this further fact, that the spine in some way applies to its line of action a softening fluid, and it is the softened gum that it actually cuts or divides.

The fluid no doubt comes from the same mouth-glands as in other cocoon-softening species, but the precise means by which it is guided by the spine I have not ascertained; whether the pit at its base has anything to do with it I cannot say, or whether this pit is a means of giving this portion of the pupa-case, which includes the eye-covers, a firm attachment to the moth; but very often it remains attached to the moth after the rest of the pupa-case has been pushed away backwards.

The imago is very delicate and easily rubbed, and such a specimen is a very disappointing representative of so curious a life-history; but a specimen in fine condition, from its delicate tints and unusual markings is very pleasing.

Firbank, Hereford.

FAROE ISLANDS.

By REV. F. A. WALKER, D.D., F.L.S., &c.

THE long mountain ranges of the Faroe Islands in full view, with a bank of snowy clouds resting along its whole extent. On nearer approach the islands present a succession of many peaks, some near the sea, others more in the background, with grassy slopes and table land intervening in front. The cliffs of Oster (East) Island wear a majestic appearance, 2200 feet in perpendicular height above the sea that laves their base, and the slopes of shale that have fallen from their weather-beaten surface. Westmanhavn, where our vessel is to make a brief stay, is situate on another island, that of Stromoe. There are also inland cliffs sideways to the sea, some 1600 feet in height, covered from top to bottom with short grass, but presenting too steep a gradient ever to be climbed, and a singular aspect, as cliffs of their steepness are usually bare, with the exception of some grassy ledges. The highest elevation in the Faroes is, I am told, 2800 feet. "Splendid nature!" said the mate of our vessel, as I stood chatting with him on the prospect this beautiful morning; and I heartily concur with him. The cliffs and hills look green after those of Iceland, being clothed with turf up to their very summits; and there is a chasm on the brink of one of them 1000 feet deep, communicating by a narrow fissure on the sea level with the waves. We are now passing between Oster and Stromoe islands, through a very narrow strait, dangerous in stormy weather. Sea caves that can only be approached by water are as numerous on one side of this strait as are watercourses trickling down the slopes on the other.

The church and dwelling houses of Westmanhavn are all built of wood as in Iceland, and there are numerous crops of vegetables on the grassy slopes around, and some patches of barley here, whereas no cereal is seen there. The potatoes, now in full blossom, look remarkably flourishing, as the climate is particularly warm and sheltered round these land-locked fjords, very different from that we have just quitted. I imagine that one cause of the diversity of the temperature is to be found in the great altitude of the Alpine heights environing the Icelandic fjords, and keeping off the sun altogether in the dark days of winter. Here the verdant hills are sufficiently high to shelter the borders of the fjord, but not perpendicular and lofty enough to cast a gloom over it, and retard its products.

Another great cause of the milder climate is no doubt to be attributed to the Gulf Stream. I captured two specimens of *Nebria brevicollis*, and observed our ordinary *Tipula oleracea* once more; also the plants *Narthecium ossifragum* and *Scabiosa*

as with us, but had no time to make further observations as we had to start very shortly again for Thorshavn. As we advance, the fjord widens, the cliffs seem more stupendous, on our right is the open sea, and in front of us are other islands of the Faroe group which we are rapidly approaching.

There are twenty-four islands in all, and one of the easternmost is known as Needle Island, from a cave at one end of the isle forming an aperture right through, and known accordingly as the "eye of the needle." The entrance to Thorshavn is said to be a very ugly one in bad weather, when the S.E. wind prevails. Thorshavn and the fields immediately adjoining appear to me to furnish a link between Iceland and southern civilization. It is true that the Faroe Isles possess no trees except in the garden borders, but in those garden borders there are more and larger currant bushes than in Iceland; and in addition mountain ash trees, willows, sycamores, &c., of fair height; and more garden flowers grown in the open air, including tiger lilies and monkshood. Then again, I see once more some of our common English wild flowers, which are not to be met with, or at all events I have not found, in Iceland, as the daisy and milkwort (*Polygala*). The flowers of the eyebright (*Euphrasia*) are larger than in Iceland, and other wild flowers as *Caltha palustris* more abundant than there. Oats as well as barley are grown at Thorshavn, and the variety and luxuriance of the wild grasses is remarkable. Earwigs and froghoppers, both unseen in Iceland, are beheld once more here. In other respects the Fauna of the two regions would appear to be very similar. Compare the following list of Faroe Island insects, the result of the necessarily brief observation of half a day spent there:—

COLEOPTERA.—*Nebria brevicollis*, Westmanhavn, Thorshavn. *Pterostichus*,* Thorshavn.

DIPTERA.—*Helophilus pendulus*,* Thorshavn. *Scatophaga stercoraria*,* Thorshavn.

LEPIDOPTERA.—*Larentia didymata*,* Thorshavn.

NEUROPTERA.—*Limnephilus griseus*, Thorshavn.

ORTHOPTERA.—*Forficula auricularia*, Thorshavn.

ARACHNIDA.—*Phalangium longipes*,* Thorshavn.

An asterisk is affixed to such species as are also noticed in Iceland. The *Nebria brevicollis* of the Faroes is replaced in Iceland by the slightly smaller but closely allied *Nebria gyllenhali*.

I may add, in conclusion, that the Faroe islanders number about 10 or 12,000, and only seven of their twenty-four islands are inhabited. The climate varies but 7° centigrade between summer and winter.

Dun Mallard, Cricklewood, N.W.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

CONTRIBUTIONS TOWARDS A LIST OF THE VARIETIES OF NOCTUÆ OCCURRING IN THE BRITISH ISLANDS.—As these papers have become somewhat voluminous in character, we have decided to discontinue their publication in the 'Entomologist.' It is understood that the author, Mr. J. W. Tutt, is making arrangements for the re-issue of the early papers, which, together with others in continuation, will appear in book-form. For further particulars apply to Mr. TUTT; Westcombe Park, S.E.

THE LATE MR. F. BOND.—To the list of notes on entomological subjects by the late Mr. Bond, contained in the memoir of him (Entom. xxii. 265), should, I think, be added that he contributed records of his captures in the Cambridgeshire Fens to the entomological portion of 'Fenland, Past and Present' (a bulky volume published in 1878). When engaged in assisting to get together the list of Lepidoptera captured in the district, and therein contained, I visited Mr. Bond at Staines, and Mr. Dunning's charming description of his visit might well apply to my own. But unfortunately my object prevented but the most cursory glance at Mr. Bond's rich collection of insects. He had written to me to come early, so I was at his home by an early hour in the morning, and my visit lasted till past ten at night, and has left a delightful memory of a kindly enthusiast, brimful of practical knowledge. I took down with me an early proof of the list, and we went through it *seriatim*, putting in Mr. Bond's localities and additional species. What this indicates may be gleaned from the text of the work, where it is stated that "upwards of fifty species, otherwise not recorded in the district, and the greater portion of which have probably become extinct," were then added by Mr. Bond, "besides much additional information as to other species." This information he gave almost entirely from memory, interspersed with reminiscences of the circumstances attending the capture of the species. He rarely referred to notes, and when he did so,—generally as to a question of date,—it was to an interleaved copy of Stainton's 'Manual,' which appeared to contain notes and dates of most of his interesting captures. This copy must be very valuable, and should not be lost sight of. When the additional matter was in type I sent it to Mr. Bond, and he again went through it and checked it, the result being that the work contains a permanent record of Mr. Bond's most interesting captures in the district, and it is well known that he was by far the most assiduous and successful collector in the rich fenlands of Cambridgeshire and Huntingdonshire before the great drainage schemes changed the face of the country. As an instance of Mr. Bond's reticence in publishing his captures may be mentioned that at the time the claim of *Argyrolepis schreberiana* to be British rested upon the single specimen taken at Yaxley by Mr. Boucard, and published in the 'Entomologist's Annual' of 1855, Mr. Bond took about a dozen specimens at Wicken, which were unrecorded. Mr. Bond explained to me the locality, and being an out-of-the-way spot, not likely to be visited, he said he felt certain the insect was still there. This has received confirmation by its capture in recent years. Among notable insects which Mr. Bond was the first to discover may be mentioned *Macrogaster castaneæ* (*arundinis*), *Tapinostola hellmanni*, and *Nonagria neurica*, and the larvæ of *N. canna* and *Noctua subrosea*. Among the Micro-Lepidoptera Mr. Bond also worked most successfully,

and in the genus *Gelechia* alone discovered at Wicken and Yaxley Fens four new species—*divisella*, *palustrella*, *oblitella*, and *subdecurtella*.—ALFRED BALDING; Wisbech.

THE REVIVAL OF THE 'ENTOMOLOGIST'S ANNUAL.'—I desire most heartily to endorse the wishes expressed in the remarks of the Rev. O. P. Cambridge, under this head (Entom. 65), that some system ought to be arrived at for rendering available to entomologists generally the many very useful notes, and even results of research, at present practically lost by reason of being hidden away in the publications of the numerous Field Clubs and Natural-History Societies of the provinces. The entomologist who makes a "science" of the study of insects takes, as a rule, one of two main lines of research. Either he will devote himself to the investigation of the habits, &c., of a special insect or group of insects, or else to that of ascertaining what individual insects exist within a given defined area, be that large or small. Now for either of these purposes a ready means of reference to what has already been done by others, in a similar direction, would be invaluable. Having myself for some years been the editor of the Journal of a provincial Field Club, I have become aware of the fact that much more really useful work is done in one or other of the above-named directions than many would suppose. At a Special Meeting of the Entomological Society in May, 1883, when the Bye-Laws were being altered, I brought this subject before the Society, considering it would be a great inducement to many to become Fellows. I then suggested the possibility of a system of abstracts being made and added to the Journal, as is done by the Chemical Society. I still hope it may yet be carried out somewhat in the manner suggested by the Rev. O. P. Cambridge, and I feel sure that all Secretaries of Field Clubs, &c., would willingly supply the copies of such of their Journals as contained papers on entomological subjects.—ALFRED LLOYD; The Dome, Bognor, Feb. 6, 1890.

HESPERIA LINEOLA IN JERSEY.—On July 21st, 1871, I paid a visit to Jersey, where I took three specimens of an *Hesperia*, which have since remained in my cabinet, labelled *H. linea* (*thamas*). On reading Mr. F. W. Hawes' note on his interesting discovery (Entom. 3), I sent him the specimens for comparison, and he informs me that they are undoubtedly *Hesperia lineola*, and resemble the specimens in the Doubleday collection in being of a browner hue than those captured by himself in 1888.—W. A. LUFF; 12, Mansell Street, Guernsey.

HESPERIA LINEOLA.—Would it not be as well that before the summer comes there should be published, in *parallel columns*, the precise points of difference between *H. thamas* and *H. lineola*? I have been informed that when thoroughly understood the differences are sufficient to enable the insects to be distinguishable in the field, or at all events in the net. This might save the heedless and needless destruction of thousands of innocent butterflies, very beautiful to the lover of nature, and, I believe, quite innocent of any injury to man. Otherwise, it is much to be feared there will, in a few months' time, be a general slaughter of every *thamas* in the country, in the hopes of taking "the last new thing."—ALFRED LLOYD; The Dome, Bognor, February 6, 1890.

[In his remarks on and comparison between these two insects, Mr. Hawes has been so explicit, that unless those who may go on the war-path

against the "Skippers," during the next season or two, are determined to slay all and spare none, our well-known friend *thaumas* should suffer no more inconvenience than that which may be caused him by capture and a brief inspection. However, that nothing may be left undone that could in any way tend to prevent unnecessary destruction, the following differential synopsis is given;—

<i>H. thaumas.</i>	<i>H. lineola.</i>
1. Tips of antennæ yellow beneath.	1. Tips of antennæ black beneath.
2. Central black streak of male slightly curved to inner margin.	2. Central black streak of male short, straight, and sometimes interrupted.
3. Hind wings beneath, inner margin fulvous.	3. Hind wings beneath, inner margin not fulvous.

1 and 3 refer to both sexes, 2 to male sex only.—Ed.]

HESPERIA LINEOLA: A CORRECTION.—There is a mistake in my note (Entom. p. 57). "On the marshes near Purfleet, Shoeburyness," should read, "on the marshes near Benfleet and Shoeburyness.—F. G. WHITTLE.

GAS-LAMP ENTOMOLOGY.—With reference to Mr. Arkle's remarks concerning the entire absence of the genus *Tæniocampa* at gas-lamps (Entom. 62), it may be of interest to record that towards the end of April, 1887, *Tæniocampa stabilis*, *T. incerta*, *T. gothica*, and *T. pulverulenta*, were all common on the gas-lamps in this neighbourhood, together with a few *T. munda* and *Pachnobia rubricosa*.—R. M. PRIDEAUX; 9, Vyvyan Terrace, Clifton, Bristol.

In view of Mr. Arkle's statement that he has never taken the genus *Tæniocampa* at gas-lamps, the following observation may be interesting. Some seasons ago I took a good number of *Pachnobia rubricosa* (or *Tæniocampa rubricosa* according to Doubleday's list), on gas-lamps in Lancashire; but no other members of the *Tæniocampa* genus came to light, although several others occur in the neighbourhood. It would thus appear that the species *P. rubricosa* is more correctly placed in the 'Entomologist' list than in the old list.—J. E. R. ALLEN; Nantelwyd House, Ruthin, N. Wales.

I am rather surprised to find, from Mr. Arkle's notes on "Gas-lamp Entomology (Entom. p. 62), that he has never captured a single *Sphinx* at light. My own experience of this branch of collecting has been exceedingly small; but on one of the few occasions when I attended to it, I found a fine *Smerinthus ocellatus*, clinging tenaciously to the outside of a gas-lamp at Tottenham. Moreover, Dr. Knaggs, in his 'Guide,' refers to the "absurd habit" that the *Smerinthus* have of creeping up underneath the lamp, and also states that *atropos*, *convolvulus* and *galii*, have been known to enter houses attracted by the light. Kirby too ('European Butterflies and Moths'), states that *A. atropos* is attracted by light. Evidently, therefore, the Sphinges are habitually light-seekers, and it certainly seems very strange that Mr. Arkle's experience has been uniformly negative of this fact; it would be somewhat interesting to hear from other collectors as to their luck. I have some recollection of reading that *M. stellatarum* has been known to come to light, but I cannot locate my authority.—F. H. PERRY COSTE; "Ravenshoe," Burnt Ash Hill.

Additions to my list (Entom. 64):—March, *T. hyemana*; October, *L. phryganella*.—J. ARKLE; Chester.

THE ELECTRIC LIGHT AT TAUNTON.—Seeing the numerous accounts of the failure of sugar last year, the better success I had at light struck me as peculiar. From the middle of May to the end of September I went out as nearly as possible every night, and even on the coldest and wettest of nights I never failed to see an insect of some kind. Among the 200 odd species I took at light during the year are:—*S. ligustri* and *S. convolvuli*, *C. porcellus* and *C. elpenor* and the three *Smerinthi*; of the Bombyces, *H. bicolorana*, *L. lurideola*, *G. quadra*, *A. villica*, *S. mendica*, *H. humuli*, *H. lupulinus* and *H. hectus*, *C. ligniperda*, *Z. pyrina*, *D. pudibunda*, *P. populi*, *L. quercifolia*, *D. lacertinaria*, *D. falcatoria*, *D. binaria* and *D. cultraria*, *D. furcula*, *D. bifida* and *D. vinula*; *S. fagi*, *P. palpina*, *N. dictæa*, *N. dromedarius*, *N. ziczac*; of the Noctuæ, *T. derasa*, *C. octogesima*, *A. diluta*, *B. muralis*, *D. coryli*, *A. ligustri*, *N. arundinis*, *H. micacea* and *H. petasitis*, *N. reticulata*, *M. persicariæ*, *M. literosa* and *M. bicoloria*, *G. trigrammica*, *A. saucia*, *N. plecta*, *T. fimbria*, *T. orbona*, *X. fulvago* (*cerago*), *C. xeram-pelina*, *C. diffinis*, *P. flavicincta*, *H. pisi* and *H. genistæ*, *C. unbratica*, *P. iota*, *P. chrysis*, *H. uncula*; and among the Geometræ, *C. apiciaria*, *M. margaritaria*, *P. syringaria*, *E. alniaria* and *E. fuscantoria*, *G. papilionaria* and *G. vernaria*, *H. strigata*, *B. piniaria*, *T. dubitata* and *E. certata*. Some moths, which are plentiful in the woods around, do not come to light, as, for instance, *T. batis* and *A. pyramidea*. The last-named is very common, but I only took one example at light. I also secured a specimen which I put down to be a variety of *M. fluctuata*; the large dark blotch in the centre of the margin of the upper wing is absent. Early in the spring, an example of *A. atropos* was taken, and in 1888 four *D. galii*. Unluckily they had found their way into the globes, and were a bit damaged.—M. FARRANT; 74, Cambridge Street, Pimlico, S.W.

[At the December meeting of the London Entomological Society, Colonel Swinhoe stated that in Bombay he had collected more than 300 specimens of Sphingidæ by means of the electric light. Mr. J. J. Walker, R.N., said that at Panama he found the electric light very attractive to insects. Mr. M'Arthur, who has just returned from India, informs me that in passing through the Suez Canal he noticed numbers of moths, many of large size, darting about in the beam of the electric light, which was worked from a sort of cage suspended over the bow of the ship.—R. S.]

EPIONE PARALLELARIA VAR.—At the foot of the recorded capture of a variety of *Epione parallelaria* which appears in the January number by Mr. Hewett, is to me a rather astonishing note by the editor, who says:—"This variety is more commonly bred than captured; some years not unfrequently." Having bred and collected this species for many years,—and I believe the experience of other York collectors will confirm me,—I must say that I have never heard of one of this variety having been bred before. This form is figured, Entom. xi. pl. 2, fig. 3. and is recorded at p. 170 of that volume as having been captured by the late Mr. Prest, on the 13th July, 1874, at its haunt near Strensall. Further mention is made of several others taken in previous seasons near the same spot, pointing to an hereditary form. Mr. Anderson and Mr. Jackson, of York, have, I believe, both captured it. There is one in the Allis' Collection in the Yorkshire Philosophical Society's Museum in this city, which looks by its rather worn

appearance, like a captured specimen; and also the one in my collection, the capture of which was recorded in Entom. xvi. p. 211. My variety, I believe, is in finer condition than any of those previously recorded; the dark purple border is strikingly intensified. I remember, in a conversation with Mr. Prest, when he came to look at my specimen (which he described as the best he had seen), saying that all examples of the variety in question had been taken close to a hillock at Sandburn, and I believe Mr. Hewett's specimen was captured within a few yards of where the others were taken. There are several pretty forms of *E. parallelaria* bred as well as captured; indeed, most of the York entomologists possess something unique in markings of the species, but I believe the natural variety, which has the centre of the wings dark brick-red, without the reticulated markings, but with the border purplish black, is exceedingly scarce. All the examples of this form have been captured about one particular spot, which seems to point to the existence of a distinct local race.—S. WALKER; 75, Union Terrace, York, January 20, 1890.

[The note referred to should have been signed J. T. C., not Ed.].

LEPIDOPTERA TAKEN IN DORSETSHIRE IN 1889.—Although rather late in the day, the following records from this district will not perhaps have lost all their interest. The general character of the season here last year, —1889, closely corresponded to that of so many other localities, being about the worst I have ever known. There seemed a good promise at the end of May and during the first week in June, but soon after that a plague of larvæ of several species completely devastated the young foliage over large areas of coppice and timber, and thenceforward there succeeded an almost complete dearth of insects. Busy among the devastating larvæ were numerous Ichneumonidæ, chiefly, as far as I could observe, one almost entirely black species. To this cause perhaps it was due that the common green oak Tortrix, *T. viridana*, was not very abundant, though quite common enough; the succeeding brood, however, of *Hibernia defoliaria*, *H. aurantiana*, and *Cheimatobia brumata*, I have never seen exceeded in numbers. Among the latter species of Lepidoptera we meet with, I may mention *Pterophora paludum*, Zell. After many visits to its localities I met with one example of each sex in good condition, on the 29th of August; no others were seen or taken. It did not appear at all in 1888, at any rate we did not meet with it, though its localities were well worked. In 1886 and 1887 (Entom. xix. p. 256, and xx. pp. 308, 326), we took it in tolerable abundance. All our efforts to find the larvæ or pupæ have as yet proved unavailing. *Psoricoptera gibosella*, which was plentiful on trunks and branches of oak-trees in 1888, did not appear in 1889. *Chauliodes illigerellus*; two fine specimens were bred from larvæ in united blossoms of *Angelica sylvestris* late in August. *Cerostoma lucella*, about twenty examples, sixteen of which were beaten from one oak-bush at different times between July 9th and September 1st; the rest were beaten from oak near the same spot, excepting one which was flying in sunshine and settling on the blossoms of the bull-daisy, in a rough field at some little distance. *Cerostoma alpella* occurred but rarely in the same locality, though in greater abundance than *C. sylvestris*, which is usually the more common species. *Elachista paludum*, one example on a bog on the heath. *E. monticola*, in a swampy spot, appeared to be pretty frequent. These two have not been before recorded from Dorsetshire. *Laverna subistrigella*, one, in a rough field. *L. lacteella*, three in the same field as the last species, at the end

of June, 1887. The four last species have been determined by Mr. Stainton. Specimens of *L. paludicola* have hitherto done duty in my cabinet for *L. lacteella*, about which last little appears to be known among entomologists generally. *Trifurcula atrifrontella*, one caught on the wing in a wood about the end of June. This also has been examined and determined by Mr. Stainton, who speaks of it as "a great rarity." *Apatura iris*, female, the first I have seen in this district; the species has not been recorded in Dorsetshire since 1841. *Plusia orichalcea*, a fine specimen taken by my friend Mr. J. J. Dunn Cooke, at Hyde, near Bloxworth, about the middle of July. *Eupithecia dodoneata*, several examples in May and June. Near Weymouth it appears to have been quite abundant last spring. *Catoptria albersana*, one taken, several seen. *Euchromia purpurana*, one taken. *Lobesia reliquana*, fairly abundant. *Eupacilia nana* several. *Tinea semifulvella*, one. *Depressaria pupurea*, one beaten out of thatch in August. *Ecophora fulviguttella*, several. *Gracilaria elongella*, several. *Lita costella*, one (the first there met with), in a swampy spot, the first week in September. *Pacilia nivea* (= *gemma*), frequent, but not in anything like its usual abundance. *Doryphora oblitella*, several in a bog on the heath. In some seasons it is fairly common. *D. lucidella*, one; not met with before in this district. *Bryotropha umbrosella*, tolerably abundant, Chesil Beach, Portland, beginning of July. *Stigmonota puncti-costana*, one flying in a wood in June. This is its first record in this county. I have not thought it necessary to arrange the above species in any systematic order, but have taken them at random, while looking over my notes of the season.—O. P. CAMBRIDGE; Bloxworth Rectory, February 7, 1890.

A CURIOUS BLUNDER.—Lord Walsingham's recent remarks on the ignorance of the public on entomological subjects have met with a curious confirmation. A writer in one of our first medical journals, speaking of the tarantula, pronounced it a "harmless beetle" (*sic*). When a medical graduate thus confounds Arachnida and Coleoptera, what may we not expect from the general public?—J. W. SLATER; 36, Wray Crescent, Tollington Park, N.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*February 5th, 1890.*—The Right Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. The President announced that he had nominated Mr. J. W. Dunning, M.A., F.L.S., Captain H. J. Elwes, F.L.S., and Mr. Frederick DuCane Godman, M.A., F.R.S., Vice-Presidents for the Session 1890—1891. Mr. B. A. Bristowe, of Champion Hill, S.E.; Mr. J. E. Eastwood, of Witley, Surrey; Mr. A. B. Farn, of Stone, Greenhithe, Kent; and Mr. O. Goldthwaite, of Leyton, Essex, were elected Fellows; and Mr. R. S. Standen was admitted into the Society. Mr. F. D. Godman exhibited a specimen of *Papilio thoas*, from Alamos, in the State of Sonora, Mexico, showing an aberration in the left hind wing. Mr. R. Trimen remarked that butterflies of the genus *Papilio* were seldom liable to variation. Mr. Charles G. Barrett exhibited a series of specimens of *Phycis subornatella*. Dup., from Pembroke, the east and west of Ireland, the Isle of Man, and Perthshire; and a series of *Phycis adornatella*, Tr., from Box Hill, Folkestone, Norfolk, and Reading; also a number of forms intermediate between the above,

taken in the Isle of Portland by Mr. N. M. Richardson. He said that these forms proved the identity of the two supposed species, which he believed were both referable to *P. dilutella*, Hb. He also exhibited specimens of *Hesperia lineola*, and a pale variety of it taken in Cambridgeshire by Mr. H. W. Vivian; specimens of *Epischia banksiella*, a recently-described species, taken by Mr. N. M. Richardson in Portland; and a specimen of *Retinia margarotana*, H.-S., a species new to Britain, discovered in Mr. Hodgkinson's collection amongst a number of *Retinia pinivorana* which had been collected in Scotland. Mr. W. H. B. Fletcher showed a series of *Gelechia fumatella* from sand-hills in Hayling Island and near Littlehampton, and, for comparison, a series of *G. distinctella*, from the same places. He also showed a few bred specimens of *G. terrella*, and a series of preserved larvæ. He stated that on the downs the larvæ live in the middle of the tufts of such grasses as *Festuca ovina* and allied species, and that on sandhills where herbage is more sparse, they make silken galleries under stones, and sally forth to eat blades of grass growing near their homes. Mr. H. Goss read a communication from Dr. Clemow, of Cronstadt, St. Petersburg, on the subject of the coincidence of vast flights and blights of insects during the years 1510, 1757, 1763, 1782, 1783, 1836 and 1847, and the epidemic of influenza. During the year 1889 no unusual activity in the insect world had been recorded. Mr. H. T. Stainton and Mr. McLachlan made some remarks on the subject, the purport of which was that there was no connection between epidemics and the occurrence of swarms of insects. Mr. G. A. J. Rothney communicated "Notes on Flowers avoided by Bees." It appeared, according to the author's observations, made in India, that dahlias were exceptionally attractive, but that the passion-flower was only resorted to by a few species of *Xylocopa*; and that, with one exception, he had never seen any insects feeding on the flowers of the oleander. Mr. Slater, Colonel Swinhoe, Mr. Trimen, Lord Walsingham, and Mr. McLachlan took part in the discussion which ensued. Dr. D. Sharp read a paper entitled "On the structure of the Terminal Segment in some male Hemiptera." Colonel Swinhoe read a paper entitled "On the Moths of Burma," which contained descriptions of several new genera and 107 new species. Dr. F. A. Dixey read a paper entitled "On the Phylogenetic Significance of the wing-markings in certain genera of the *Nymphalidæ*." A long discussion ensued, in which Lord Walsingham, Mr. Jenner Weir, Capt. Elwes, Mr. Trimen and others took part.—H. Goss, *Hon. Sec.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*February 6th, 1890.*—J. A. Clark, F.E.S., President, in the chair. Messrs. A. Quail, J. A. Simes, and W. Cook were elected members of the Society. Mr. Raine exhibited specimens of preserved larvæ, including a fine variety of that of *Phalera bucephala*, L. Mr. G. Bryant, preserved larvæ and pupæ of *Apatura iris*, L., *Papilio machaon*, L., *Limenitis sibylla*, L., and *Nemobius lucina*, L. Mr. Whittle, a variety of *Epinephele ianira*, L., having the left hind wing nearly bleached. Mr. J. A. Clark, 24 species of *Tineina*; also currant-stems, showing ravages of larvæ of *Sesia tipuliformis*, Clerck. Mr. J. W. Tutt exhibited photographs of a number of varieties of *Arctia caia*, L., and *A. villica*, L., *Spilosoma menthastri*, Esp., and *S. lubricipeda*, Esp., and *Abraxas grossulariata*, L., the extent of variation being of much wider range than either he or any of the members present

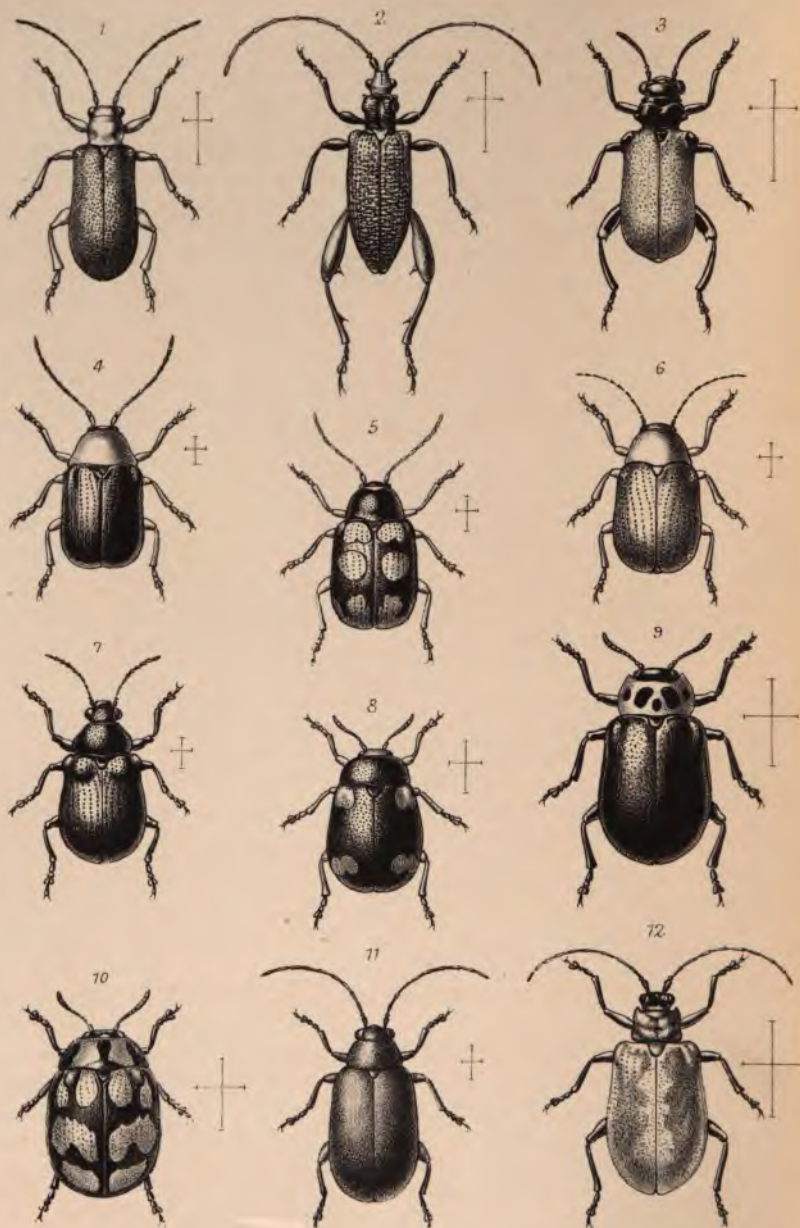
had ever seen in English collections. He also remarked on the recent discovery of *Hesperia lineola* Ochs., which hitherto had been passed over as *Hesperia thauwas*, Hufn., in Britain. The same member, referring to Mr. O. Goldthwaite's exhibit of *Lycænidae*, pointed out the similarity of these and other Continental species to *Lepidoptera* indigenous to this country, and considered, that as the latitude, climate, and geology were nearly identical, other species might have been overlooked. In *Coleoptera*, Mr. Cripps exhibited Plymouth species. Mr. Heasler, *Dromius 4-notatus*, Panz. Mr. Bellamy, *Hydrophilus piceus*, L., *Dytiscus punctulatus*, F., *Molytes coronatus*, Goeze, and *M. germanus*, L. Mr. Milton, *Carabus nitens*, L., and *Trichius fasciatus*, L. Mr. G. A. Lewcock reported on the *Coleopterous* species prevalent in 1889, giving an account of the insects obtained by him at Chattenden, including *Brachytarsus scabiosus*, F., *Tillus elongatus*, L., *Anthrribus albinus*, L. (by Mr. Cripps), and 40 specimens of *Malachius æneus*, L.; at Rainham (Essex), *Geodephaga* were plentiful in early spring; at Epping Forest aquatic species were abundant in both spring and autumn, and several specimens of *Dytiscus punctulatus*, F., *Hydrous caraboides*, L., *Ilybius ater*, De G., &c., were among the captures; many species were also obtained from Farnham, Esber, Woking, and other localities.—G. A. LEWCOCK, E. HANES, *Hon. Secs.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—January 20th, 1890.—Mr. W. E. Blatch, President, in the chair. The Rev. Chas. F. Thornehill exhibited *Acidalia immorata*, also *Noctua festiva* var. *conflua*, the latter being from Scotland. Mr. C. J. Wainwright showed *Cabera rotundaria*, from Sutton Park. Mr. H. Tunaley read a paper on the entomology of Porlock, in Somersetshire and the neighbourhood, giving a good description of the place, and a list of the *Lepidoptera* taken, which included some rare species. The insects captured were exhibited.

February 3rd. — Annual Meeting.—Mr. W. E. Blatch in the chair. The report of the Council for the past year was very satisfactory, showing a considerable amount of work done in this their first year. The Treasurer's report was read, which showed a slight balance in hand. The following gentlemen were elected as officers for the ensuing year:—Mr. W. E. Blatch, President; Rev. Charles F. Thornehill, F.E.S., Vice-President; Mr. R. Bradley, as Treasurer; and Mr. C. J. Wainwright, as Secretary, the remaining members of the Council being Messrs. W. E. Lee and E. C. Rye.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

OBITUARY.

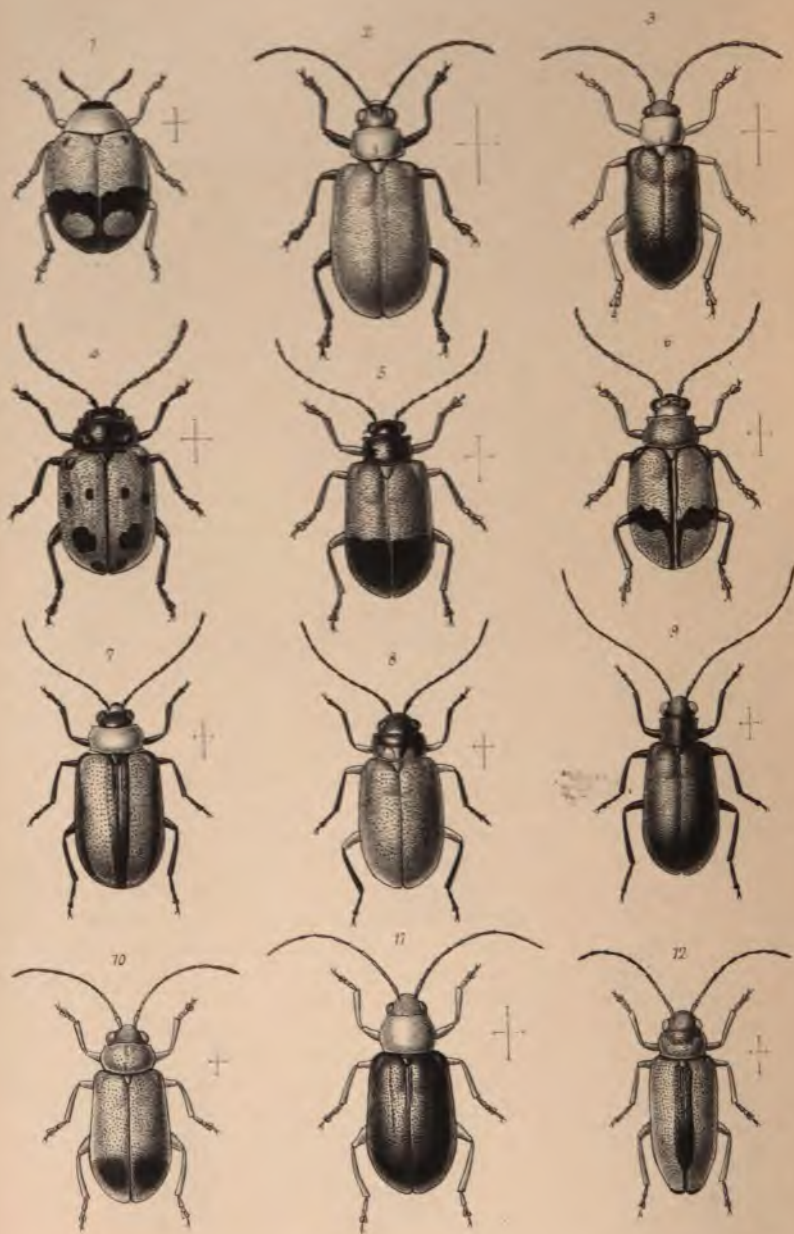
ARTHUR BLISS died January 29th, 1890, at the early age of 32 years. For some time past his health had been far from robust, but the immediate cause of his death was pneumonia supervening on influenza. Mr. Bliss was a member of the South London Entomological and Natural History Society from 1874, and at one time ably discharged the duties of secretary to that body. In March, 1885, he was elected a Fellow of the Entomological Society of London. Although specially interested in the lepidopterous fauna of his own country, he also formed a collection of tropical species, but, with the exception of a few observations recorded in the 'Entomologist,' he does not seem to have contributed much to the literature of his study.



W Purkiss del. et lith.

West, Newman imp

New species of Coleoptera from China.



del. et lith.

West, Newman imp

New species of Coleoptera from China.

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[No. 328.]

ON AN ADDITIONAL AID TO THE DETERMINATION OF CERTAIN BRITISH GYRINIDÆ.

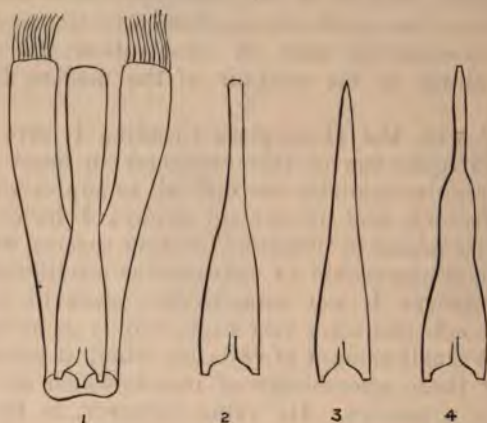
BY JAMES EDWARDS, F.E.S.

IN the case of a genus like *Gyrinus*, where so much difference of opinion exists amongst authorities as to the value of the specific characters hitherto in use, one experiences an amount of gratification more than ordinary in calling attention to a structural character comparatively easy of observation and practically constant; I allude to the contour of the median lobe of the cedeagus.

In dealing with the Homoptera-Cicadina I have long been accustomed to make use of this character in cases where the other characteristics available are difficult to appreciate or otherwise unsatisfactory, and in certain groups I have frequently succeeded by its means in definitely limiting species, which it was otherwise almost impossible to characterize intelligibly. Under these circumstances I, not unnaturally, place its value as a differential specific character very high, mainly on account of the infinitesimally small amount of variation which it presents in the individuals of those assemblages of insects which we are accustomed to call a species. Its value, however, is by no means uniform, and each case must be judged entirely on its merits. For instance, there are many species of *Typhlocyba* whose identity may be decided from an inspection of this part alone; while, on the other hand, it would be impossible to refer the same organ from several species of *Limotettix* to the species to which they belonged, on account of their great similarity *inter se*; and it is worthy of remark that the latter insects would probably be readily separable by differences in colour and facies, whilst the former resemble one another so closely in those respects that they can only be identified with certainty by a reference to the male genitalia. These examples are taken from the Cicadina; but so

far as I am at present able to judge, the result in the Coleoptera will be very much the same.

As observable in dried specimens, the *œdeagus* of *Gyrinus* is a corneous body consisting of a median and a pair of lateral lobes, found between the dorsal and ventral surfaces of the last abdominal segment; for a short distance from its base it is somewhat oval in section and parallel to the long axis of the body, but its parts are abruptly and obliquely bent upwards to follow the curve of the last ventral segment. The side lobes, the form of which does not vary in any marked degree in the several species, have the basal half of their inner faces excavated for the reception of the basal half of the median lobe; their apical half is flattened and blade-like, and their apices are fringed with long cilia. The form of the median lobe is various, and peculiar to the respective species; its contour in some of our species may be gathered from the outline figures. The latter are made from specimens in Canada balsam, and magnified 40 diameters; but in the Table of Species I have described its appearance when merely dissected out and viewed from above with a hand-lens magnifying about 20 diameters.



1, *œdeagus* of *Gyrinus elongatus*. 2, Median lobe of *œdeagus*, *G. opacus*;
3, of *G. marinus*; 4, of *G. bicolor*.

As it became necessary, in the preparation of this paper, to re-examine the British species of *Gyrinus*, I have thought it well to include some general observations, with a Table of our species to facilitate their determination.

It is evident that we have in Britain two kinds of *Gyrinus* with the reflexed margins of the thorax and elytra testaceous and the interstices of the latter sculptured; in one of these (*a*)

the interstices are very finely but distinctly punctured, and in the other (*b*) the same parts are transversely subtrigose. Although these insects have been in our lists for more than twenty years, there is still much diversity of opinion as to the names to be applied to them. Dr. Sharp, in introducing the insects in question in his valuable paper on the "British Gyrinidæ" (Ent. Mo. Mag. v. pp. 57, 58), adopts the name *caspius*, Aubé, for *a*, and *colymbus*, Er., for *b*; but *caspius*, Aubé, which according to authors = *caspius*, Mén., should have smooth interstices, whilst in *colymbus*, Er., the same parts should be extremely finely punctured. Dr. Regimbart is a great authority on these insects, and doubtless has some good reason for treating the two forms under consideration as one species, but certainly none appears from his Monograph; nor is it clear why the name *caspius*, originally given to a form with the interstices smooth, should be applied to insects exhibiting respectively two kinds of sculpture on the interstices. Canon Fowler, in 'Col. Brit. Islands' (vol. i.), includes both forms under the name *caspius*, Mén., at p. 212, and at p. 214 he deals with them under the name *colymbus*, Er. After copying Regimbart's synonymy and translating that author's description of *caspius*, Mén., he proceeds to examine the characters laid down by authors for *colymbus* and *caspius*, and concludes by very properly proposing a distinctive name for the form *b*. Under all circumstances it seems to me better to adopt the name *colymbus*, Er., for *a*, and *striolatus*, Fowler, for *b*; at all events until it is shown, more conclusively than at present, that they ought to bear some other. I have been unable to obtain males of either of these species for dissection, but I have a female of *colymbus*, Er., taken by myself in the Norwich district. This insect was, until recently, standing amongst my specimens of *natator*, where it attracted my attention by its less convex form, and the straighter sides and more evident outer apical angle of its elytra.

In re-defining the species which he calls *caspius*, Ménétr., at p. 259 of his Monograph, on the challenge of M. de Borre, Dr. Regimbart omits all mention of the form with the interstices subtrigose. The former writer seems to think that the *caspius* of Regimbart, with its varieties, and *suffriani*, Scrib., are forms of *natator*, Scop., and he appears to base his opinion on the fact that it is not impossible in some, perhaps in most, specimens of the species last named, with an amplification of about 40 diameters, to detect feeble traces of very fine punctuation. For all practical purposes, however, the interstices of *natator* may be regarded as impunctate. M. de Borre says that he has found all the intermediate forms between *caspius* and *natator*, which, assuming that his *caspius* is the same as that of Aubé, is intelligible enough; for it is not clear how the genuine *caspius* of that

author is to be separated from *natator*. With regard to the question of the specific identity of *suffriani* and *natator*, the views of M. de Borre are scarcely likely to be largely adopted. Such matters as these might be well decided by a reference to the male genitalia.

TABLE OF SPECIES.

- | | | |
|----------|--|--------------------------------|
| 1 (4). | Under side wholly testaceous. | |
| 2 (3). | Scutellum with a broad well-defined keel at the base. Upper side dull | 1. <i>minutus</i> , Fab. |
| 3 (2). | Scutellum simple. Upper side very shiny | 2. <i>urinator</i> , Ill. |
| 4 (1). | Under side wholly or in greater part black. | |
| 5 (6). | Punctures of the inner striæ becoming stronger towards the base | 3. <i>suffriani</i> , Scrib. |
| 6 (5). | Punctures of the inner striæ becoming finer towards the base, or uniform. | |
| 7 (16). | Reflexed margins of thorax and elytra testaceous. | |
| 8 (11). | Interstices sculptured. | |
| 9 (10). | Interstices closely and very finely punctured | 4. <i>colymbus</i> , Er. |
| | <i>caspius</i> , Sharp; Regimbart, pars; Fowler, pars; nec Mén., nec Aubé. | |
| 10 (9). | Interstices transversely sub-strigose | 5. <i>striolatus</i> , Fowler. |
| | <i>colymbus</i> , Sharp; nec Er. | |
| | <i>caspius</i> , Regimbart, pars; nec Mén., nec Aubé. | |
| 11 (8). | Interstices smooth. | |
| 12 (13). | Form ovate. Length of elytra one-seventh (♀) to one-fourth (♂) greater than their joint width | 6. <i>natator</i> , Scop. |
| 13 (12). | Form oblong-ovate, or even elongate and compressed. Length of elytra one-third, or more than one-third, greater than their joint width. | |
| 14 (15). | Average size smaller. Outer apical angle of elytra obtuse but evident. Mesosternum and apex of abdomen rufo-testaceous. Dorsal aspect of median lobe of ædeagus strap-shaped, slightly narrowed to its broadly rounded apex, a little below which its sides are very slightly concave | 7. <i>elongatus</i> , Aube. |
| | | <i>distinctus</i> , Sharp. |
| 15 (14). | Average size larger. Outer apical angle of elytra completely rounded off. Mesosternum and apex of abdomen black. Dorsal aspect of median lobe of ædeagus elongate-triangular, somewhat attenuate in its apical half, apex sub-acute | 8. <i>bicolor</i> , Payk. |
| 16 (7). | Reflexed margins of thorax and elytra nigro-æneous. | |

- 17 (18). Punctures of the inner striæ not, or scarcely finer than those of the outer. Dorsal aspect of median lobe of cedeagus elongate-triangular, apex acute 9. *marinus*, Gyll.
- 18 (17). Punctures of the inner striæ distinctly finer than those of the outer. Dorsal aspect of median lobe of cedeagus elongate-triangular, suddenly narrowed about half-way from the base, and thence parallel-sided to its subtruncate apex ... 10. *opacus*, Sahl.

For the examination of the sculpture of the interstices in these insects an amplification of about 40 diameters is very convenient.

Both *G. elongatus* and *G. bicolor* are subject to considerable variation in shape, some specimens being very narrow and convex. In the English descriptions of the latter insect too great a point is made of its more elongate and parallel form, as a means of distinguishing the species from *elongatus*,—probably because most, if not all, of the authentic British specimens pertain to the var. *angustatus*; but Dr. Sharp has kindly given me some Swedish examples of veritable *bicolor*, not one of which actually belongs to that variety, and which, so far as size and form are concerned, I can exactly match with a few abnormally large females out of an extensive gathering of *elongatus*. Here, however, the form of the elytral apices, and the colour of the meso-sternum and apex of the abdomen, serve to separate the two species. I mention this to show that a *Gyrinus* may be the true *bicolor* without being exceptionally elongate, parallel-sided, and convex.

Several of our species have a dull form, resembling in that respect the normal form of *minutus*; I have it, in both sexes, in *suffriani*, *natator*, *marinus* (in which species it is very frequent), and *opacus*.

131, Rupert Street, Norwich, March 15, 1890.

NEW SPECIES OF LEPIDOPTERA FROM CHINA.

By J. H. LEECH, B.A., F.Z.S., &c.

(Concluded from p. 83.)

CAMPYLOTES PRATTI, sp. n.

Agrees in design with *Campylotes* (*Epyrgis*) *desgodinsi*, Oberthür (Etud. d'Ent. 9, pl. xi. fig. 10), but differs therefrom in its larger size and in having a black transverse basal band on primaries; the inner portion of the basal half of all the wings is decidedly yellow instead of salmon-pink, as in *desgodinsi*. Further, the pectinations of the antennæ are much longer. Expanse, ♂ 70 mm., ♀ 82 mm.

I received a number of specimens from Chang Yang. From their fine condition these appeared to have been bred.

EUSEMIA VITHOROIDES, sp. n.

♂. Ground colour black; primaries with two creamy white blotches in the cell, one near the base, the other towards the extremity; a central series of five spots of the same colour, the first, third and fourth longitudinal and larger than the rest; there is also a whitish streak at the base of wing; on the costa near the base are three bluish transverse bars, and parallel with outer margin three indistinct rows of bluish spots; a row of longitudinal marks along inner margin. Secondaries with a broad creamy white basal band, and central band of spots of the same colour; between these bands is situated a large creamy white blotch. Fringes white, chequered with black. Abdomen black, with a white ring at its base, and an orange one on last segment; anal tuft also orange. Under surface much as above, but more tinged with blue; a very distinct submarginal band of whitish spots on primaries, and a whitish basal streak on costa of all the wings; pectus and abdomen rich orange; legs black. ♂ Expanse, 73 mm.

One male taken at Chang Yang in June.

This insect bears a wonderful superficial resemblance to *Vithora stratonice*, Cram., of which species it is probably a mimic.

SEUDYRA SUBALBA, sp. n.

♂. Closely allied to *S. longipennis*, Walk., but the ground colour of primaries is white, thickly sprinkled on basal half with dark grey, the inner margin is not shaded with bluish grey, but there is a patch of this colour between the central lines; the laky brown apical patch encloses a small bluish cloud which has a paler, almost white, spot on its exterior edge; the patch of brown beyond outer line is larger and more crimson in tone. Secondaries yellow, broadly bordered with black. Under surface of primaries white; costa narrowly and outer margin broadly bordered with black, the latter tinged with white at apex; there is a patch of the same colour along inner margin from base to beyond middle, and the discal spots are also black; secondaries as above. Expanse, 44—47 mm.

Five male specimens from Chang Yang, where they were taken in June, and one example of the same sex from Ichang, also taken in June.

SEUDYRA MANDARINA, sp. n.

♂. The costal and central portion of primaries greyish, sprinkled with darker scales; discoidal spots blackish, ringed with pale grey; inner and outer marginal areas purplish, clouded with purplish brown. Secondaries deep orange, with a large, round, black central spot; a submarginal band of black confluent spots, connected from the anal angle with the base of the wing by a blackish suffused streak. Under surface deep orange, clouded with reddish brown about the margins; discal and central spots on primaries, and discal and anal spots on secondaries, black. Expanse, 50 mm.

A fine male taken at Chang Yang in July.

SEUDYRA FLAVIDA, sp. n.

♂. Primaries grey, sprinkled with brownish scales; apical portion and outer margin clouded with purplish brown; along the inner margin is a large patch of purplish brown, maroon at the base and towards inner angle, this is traversed by two black bars intersected by a yellowish line; discal spots purplish brown, ringed with white; secondaries orange-yellow, *without any black markings*. Under surface dull golden orange, clouded with *reddish brown* about the outer margins; discal spots and patch along inner

margin of primaries blackish brown; there is also a blackish discal spot on secondaries. Expanse, 66 mm.

Three males taken at Chang Yang in August.

CHELONIA BIETI, Oberth.

Var. *pratti*.

This form is larger than the type; the transverse band on primaries from costa to inner angle is much broader and more irregularly outlined; the black markings on secondaries are more pronounced, and in addition there are two round black spots towards the base of the wing. The segmental divisions of the body are bright scarlet, of which colour there is also a broad band along each side. The under surface agrees with the upper, which is not the case in the type. Expanse, 74 mm.

Three females of this form taken at Chang Yang in June.

DIONYCHOPUS RUBIDUS, sp. n.

♀. Ground colour white, rather silky; secondaries with a submarginal row of four black spots, one situated towards outer angle, the other three near anal angle, the last two of which are only separated by the submedian nervure; there is also a small black bar-shaped mark situated at the end of the cell. Under surface as above, with the addition of a small black spot at base of secondaries. Abdomen brilliant crimson above, white beneath, with dorsal and lateral series of black quadrate spots; tip of anal segment white. Femora and tibiae of anterior legs crimson; there is also a crimson mark below each eye; antennae black, white at the base and apex. Expanse: ♂ 74 mm.; ♀ 69 mm.

Two specimens taken at Chang Yang in July and August.

Allied to *Dionochopus niveus*, but differs especially in the crimson body, black spots of secondaries, and colour of antennae.

CRINOLA FLAVICOLLIS, sp. n.

Semitransparent whitish; neuration, costa, outer margin, and fringes of all the wings fuliginous-grey. Head and thorax fuliginous-grey; collar yellow. Abdomen whitish, ringed with fuliginous-grey towards base. Expanse, 40 mm.

Four specimens taken in May and June at Chang Yang.

GYNÆPHORA PLUTO, sp. n.

♂. All the wings sooty black; primaries slightly paler at the end of the cell; under surface the same, but rather paler; legs, pectus and abdomen dirty yellowish white; head and palpi bright orange. Expanse, 36 mm.

Two male specimens taken near Ichang, one in July, the other in August.

ARTAXA MONTIS, sp. n.

♂. Primaries pale yellow; a thin sprinkling of black scales forms a band from the centre of the wing to the inner margin. Secondaries white, with a yellow tinge, rather silky. Head and thorax orange; abdomen black, except the first and anal segments, which are orange. Under surface silky white; abdomen and legs yellowish. Expanse, 40 mm.

A single male taken at Chang Yang in June.

ORGYIA PRISCA, sp. n.

♂. Primaries chestnut-brown, traversed by two darker transverse lines, the inner line almost straight, the outer first curves towards the apex, then

descends obliquely to inner margin; discal area of wing towards the costa suffused with darker; there are a few white scales about the centre of the costa and a small white apical dash. Secondaries chocolate-brown. Under surface light brown, suffused with darker. Expanse, 30 mm.

I received a nice series of males taken at Chang Yang in June and July.

NUMENES DISPARILIS, Staud., Rom. Mém. Lep. iii. p. 200, pl. xi. fig. 2, a, b (1887).

Var. separata.

♂. This form differs from the type on primaries in having a band connecting the yellowish white fascia with the apex, also a white spot near the base of the costa; on the secondaries the typical white central patch is absent.

The female differs in the wide basal band of primaries, and in having two black spots instead of a streak on secondaries.

Both sexes exceed typical measurements, the difference being ♂ 58 mm., ♀ 82 mm., as against ♂ 50 mm., ♀ 58 mm.

Two males and a female taken at Chang Yang in July.

JANA MANDARINA, sp. n.

Primaries: inner two-thirds chocolate-brown, very woolly about the base; central line straight, dark chocolate; outer line dark chocolate, straight, bordered internally with whitish brown; submarginal line blackish brown, wavy, dividing the outer third of wing into two nearly equal parts, the outer of which is light brown, the inner suffused with darker. Secondaries pale brown, suffused with blackish scales about the disc; two straight central lines and a wavy submarginal line dark brown. Thorax chocolate-brown; abdomen ferruginous; antennæ black. Under surface ferruginous-brown, with the markings of upper surface rather darker. Expanse, 79 mm.

One female taken at Chang Yang in July.

ANTHERÆA THESPIS, sp. n.

Ground colour pale olive-brown; primaries sprinkled about the discal area with brownish orange scales; a large pale green subhyaline spot nearly circular, margined with black, and intersected by a white line, is situated about the centre of the wing towards costa; beyond this spot the wing is traversed by a row of subhyaline spots partially obscured by scales, and connected by a dark wavy line, externally bordered with orange; beyond this is a broad wavy band of chocolate-brown; there is also a wavy, indistinct, chocolate submarginal line, and the apical patch is ashy grey. Secondaries with a distinct ocellus; the centre is a large pale green subhyaline pear-shaped spot, bordered with black, the edge of this last is intersected by a white line, and the whole is surrounded by bright yellow which merges into the ground colour, and is bordered by black on its upper and outer portions; bands as on primaries, but the subhyaline spots more open; thorax and base of all the wings thickly clothed with woolly scales. Abdomen russet-brown. Under side much as above, but suffused with violet-grey. Expanse, 162 mm.

One female taken at Ship-y-Shan, near Ichang, in September.

DREPANA PARVULA, sp. n.

Ground colour of primaries mouse-grey; at the end of the cell are two white dots, from the first of which a dark line curves to the inner margin; two other dark lines start from the apex, one descending with a slight curve to the outer angle, the other to the centre of inner margin; at the apex is a

small yellowish spot, bordered externally with black. Secondaries brownish grey; head and thorax mouse-grey; abdomen brownish grey. Under surface silky white, upper portion of primaries shaded with grey. Expanse, 24 mm.

One example from Chang Yang, July. Four specimens, including both sexes, taken by myself at Ningpo in April, 1886.

DREPANA ACUMINATA, sp. n.

♂. Pale reddish brown; apex of primaries blackish, much produced and acutely pointed; two dark brown lines traverse the disc of the wing, the first is deflected to median nervure, then inflected to inner margin, the second runs from costa towards outer margin as far as first discoidal nervule, where it joins a darker apical streak, then turns inwards and descends obliquely to inner margin; an obscure submarginal line; two small black central spots. Secondaries have two central dark brown lines, the first curved and the second straight; submarginal line slightly wavy, also dark brown. Under surface whitish, tinged with brown over costal area of primaries, one central black spot; a dark brown line traverses the wing from near blackish apex to inner margin; submarginal line obscure; secondaries have a central black spot and dark brown transverse line; submarginal line also dark brown, but very faint. Expanse, 39 mm.

One male specimen taken in July at Ichang.

Allied to *D. falcataria*.

DREPANA BIDENS, sp. n.

Primaries: outer margin deeply concave below the apex and less deeply before inner margin; purplish black, outer margin bordered with tawny, interrupted by a line and cloud of the ground colour and preceded by a broad whitish band. Secondaries similar to primaries, but rather paler and without whitish submarginal band. Under surface pale ochreous-brown; discal area suffused with dark grey. Expanse, 30 mm.

One example taken in July at Chang Yang.

DREPANA FLAVILINEA, sp. n.

♀. Smoky grey, tinged with violet; basal line of primaries yellowish, but not clearly defined, central line yellow, starting from the yellowish apex; submarginal line is also yellowish, narrow, united with central line towards apex; all these lines are continued across the secondaries: the apex of primaries is produced and obtusely pointed; there is a minute white central spot. Under surface pale ochreous-brown. Discal areas of all the wings suffused with greyish, and traversed by a faint line; a small white central dot on primaries. Expanse, 32 mm.

Two female specimens taken in July at Chang Yang.

THYATIRA TRIMACULATA, Brem.

Var. *chinensis*.

Primaries chocolate-brown; there are three nearly round white patches with brown centres, one at the base,—this is the largest, and has the brown centre sprinkled with black scales,—one at the apex, and one at the outer angle; there is a series of pale marginal lunules. Secondaries fuscous-brown, paler towards the base, with a dark central spot and line. Under surface fuscous-grey, paler towards the inner margins.

Female like the male, but larger. Expanse: ♂ 38 mm.; ♀ 41 mm.

Differs from the type in size, darker colouring, and different shape of the spot at outer angle of primaries.

A nice series from Chang Yang, June and July. Ichang, August.

Var. albomaculata.

Arrangement of markings as in "*var. chinensis*," but spots almost white; secondaries much paler, and with central spot and line very distinct. Expanse, 48 mm.

One female taken near Ichang in August.

DESCRIPTIONS OF NEW SPECIES OF PHYTOPHAGOUS
COLEOPTERA RECEIVED BY MR. J. H. LEECH, FROM
CHANG-YANG, CHINA.

By MARTIN JACOBY, F.E.S.

(Continued from p. 89.)

DIORYCTUS VARIABILIS, n. sp.

Black; the head, antennæ, thorax and the legs fulvous; elytra black, extremely finely punctate-striate.

Var. Head and thorax nearly black. Length 1—1½ line.

Head with a few extremely fine punctures, visible only under a strong lens; eyes slightly but broadly emarginate, the emargination rounded; antennæ entirely fulvous, short, the terminal joints lightly and gradually thickened; thorax of the same shape as in the preceding species, and similarly coloured, entirely impunctate; scutellum invisible; elytra with the basal lobe scarcely produced, black, the punctured striæ scarcely perceptible; legs fulvous; prosternum much broader than long, its surface flat without anterior projection.

This small species is similarly coloured as the preceding, but differs totally from it in the nearly impunctate head and elytra, their shape, and the structure of the prosternum; the variety does not seem to differ, except in its almost entirely black colour.

AORIA CHINENSIS, n. sp.

Fulvous, pubescent; the antennæ (the basal joints excepted), the apex of the femora and the tibiæ, black; thorax coarsely punctured; elytra depressed below the base, punctate-striate, the interstices more or less costate.

♀. Elytra more strongly costate.

Var. Head or thorax black; legs entirely fulvous. Length, 2½—3 lines.

A. chinensis, although closely allied to *A. nigripes*, Baly, and *A. bowringii*, is quite distinct; the head, which is either fulvous or black, is closely punctured; the antennæ are black with the exception of the lower four joints, which are fulvous, they extend nearly to the end of the body; the thorax is less globose than in the allied species, more transverse in shape and has an obsolete transverse depression at each side, the surface is coarsely punctured and clothed with fulvous pubescence; the elytra are

similarly pubescent, and have a distinct oblique depression at the base, which is absent in *A. nigripes* and *A. bowringii*; the punctures are transverse in shape and frequently arranged in double rows, the interstices are slightly convex, in most specimens the legs are black, with the base of the femora fulvous; in others the head, antennæ and legs are entirely black.

Several specimens.

TALMONUS, Fairm.

This genus, recently described by M. Fairmaire, seems to me to be identical with *Lypesithes*, Baly, and his species, *T. farinosus*, with *L. ater*, Motsch. (*pulverulentus*, Jac.). This is, therefore, the third time that Motschulsky's species has been described under different names.

Many specimens.

NODOSTOMA ORIENTALE, n. sp. (Pl. I. fig. 7).

Greenish-æneous, the base of the antennæ and of the femora, fulvous; head and thorax closely and finely punctured, the sides of the latter subangulate: elytra strongly punctate-striate, the base connex; femora with a minute tooth.

♂. Elytra less regularly and subgeminate punctate-striate.

♀. Elytra very regularly punctured, with a short oblique costa below the shoulders. Length, 2 lines.

♂. Of dark greenish-æneous colour, the head rather closely and strongly punctured and subrugose, the epistome not separated from the face; labrum fulvous; antennæ about half the length of the body, the lower four joints fulvous, the first stained with black above; thorax about twice as broad as long, the sides distinctly angulate at the middle, the surface rather closely but somewhat less strongly punctured than the head; elytra with the base distinctly swollen and depressed below the raised portion, the base rather irregularly punctured, the striae more regular posteriorly but here and there appearing double, the shoulders prominent, forming a slight ridge; the femora with a very minute tooth.

N. orientale seems closely allied to *N. puncticolle* Weise, also from China, but differs in the punctured clypeus, the angulate sides of the thorax and the swollen base of the elytra; the latter is much more distinctly visible in the female, which may be mistaken for another species, since the elytral punctuation is very strong and regular throughout, a short but strong oblique costa extends from the shoulder to the lateral margin, all other characters agree with that of the male; both sexes were obtained in sufficient numbers.

NODOSTOMA GIBBOSUM, n. sp.

Oblong-ovate, widened behind, dark æneous; the labrum, base of the antennæ and base of the femora and tibiae fulvous; thorax closely and strongly punctured; elytra convex, strongly widened, finely punctate-striate. Length, $1\frac{1}{2}$ line.

Head closely and strongly punctured, the vertex subrugose, the epistome also strongly punctured, separated from the face by an obsolete transverse depression, its anterior edge deeply concave-emarginate; labrum and palpi fulvous; antennæ black, the lower three joints fulvous, the first stained with

piceous above; thorax about one half broader than long, the sides rounded and widened, very obsoletely angulate below the middle, the anterior angles slightly pointed, the surface very strongly and rather closely punctured, a narrow longitudinal central space as well as the extreme anterior margin, smooth; elytra convex, strongly rounded towards the middle and pointed at the apex, the punctures rather finely impressed but distinct to the apex, the base with a shallow transverse depression, only visible in certain lights, the interstices above this depression subtuberculate (male), or subcostate (female), the sides in the female also furnished with a short costa below the shoulder and a longer one further inwards; the four posterior femora minutely toothed.

This species, which has all the characters peculiar to the genus, is much distinguished by its shape and the sculpture of the elytra; the thorax also is longer than is usually the case, and its sides are scarcely angulate.

A few examples.

CLEORINA LEFEVREI, n. sp.

Metallic dark blue or violaceous; antennæ black, the basal two or three joints fulvous; finely and moderately closely punctured; elytra with a transverse depression below the base, finely punctate-striate. Length, $1\frac{1}{4}$ — $1\frac{1}{2}$ line.

Of broadly ovate shape, the head rather closely and distinctly punctured, the epistome not separated from the face, the anterior edge of the clypeus deeply concave-emarginate; antennæ less than half the length of the body, black, the third and fourth joints of equal length, the lower three fulvous, the basal joint stained with metallic-blue above; thorax transverse, twice as broad as long, the sides nearly straight, the surface punctured like the head, the punctures subremotely placed; scutellum impunctate, broad, its apex acute; elytra with a deep transverse depression below the base, the shoulders prominent, the punctured striæ fine (except within the depression), nearly indistinct at the apex.

Closely allied to *C. janthina*, Lefèv., but quite distinct. Numerous specimens were obtained.

CHRYSOMELA SERIEPUNCTATA, ? Weise.

The description of this *Chrysomela* from Siberia, by the author in Wiegmann's 'Archiv,' 1887, agrees so closely with the specimens from Chang Yang, that I must refer them to that species, the more so as the very numerous and variable species already described, from the East, are for the greater part very difficult to separate. The present insect is entirely metallic dark blue, the thorax is very finely and rather closely punctured on the disc (Weise says not closely), and the sides have a deep row of coarse punctures (deepest near the base), which limit the nearly smooth lateral and slightly raised marginal space; the elytra have numerous rows of strong punctures, which only at the sides can be distinguished as being arranged in pairs, the interstices are nearly as strongly, sometimes more finely, punctured. All this agrees with the author's description.

CHRYSOMELA SIBIRICA, Weise.

Numerous specimens, agreeing entirely with the author's description, were obtained by Mr. Pratt; the upper surface of the

insect is of a violaceous-cupreous colour; the thorax is very finely punctured on the disc, coarsely at the sides, which latter have a deep longitudinal depression at the base; the elytra have four double rows of deep punctures, with numerous finer ones on the interstices.

PHYTODECTA FLAVO-PLAGIATA, n. sp. (Pl. I. fig. 8).

Black; the head, apical joints of the antennæ, and the legs partly, fulvous; thorax finely punctured; elytra more strongly and semi-regularly punctate, black, a transverse spot on the shoulder and another near the apex, flavous. Length, $2\frac{1}{2}$ —3 lines.

Of subquadrate and moderately convex shape, the head fulvous, finely and rather closely punctured; antennæ not extending beyond the thorax, the lower five joints fulvous, the others black, very broadly dilated; thorax about three times broader than long, the sides rather strongly rounded, the surface finely and rather closely punctured on the disc, the punctures of various size, those at the sides much larger, the lateral margins slightly thickened, smooth and fulvous, the rest of the disc black; scutellum very broad, impunctate; elytra not broader at the base than the thorax, more strongly punctured than the latter, the punctures partly arranged in rows, the shoulders with a transversely-shaped flavous spot, and another one of similar shape placed at the sides and at some distance from the apex; the under side and legs nearly black, the femora and tibiæ more or less fulvous. Easily known from its congeners by the coloration of the elytra; the sub-apical spot of the latter is generally more or less constricted at its middle.

Four specimens.

MELASOMA MACULICOLLIS, n. sp. (Pl. I., fig. 9.)

Metallic violaceous blue; thorax flavous, finely punctured with five spots, placed transversely; elytra semi-regularly punctured, longitudinally impressed below the shoulder; sides of abdomen fulvous, spotted with black. Length, 5—6 lines.

Head finely punctured at the sides; antennæ not extending beyond the thorax, the terminal joints gradually thickened, black, the basal four joints more or less fulvous below; thorax narrowly transverse, the anterior margin concave at the middle, the sides strongly rounded anteriorly, the surface very finely punctured, flavous, with five black spots, a small one at each side, another at the middle of the base, and two large spots at the middle of the disc; scutellum black; elytra broader than the thorax, metallic dark blue, rather closely and finely punctured, the punctures arranged partly in single or double rows; a short distinctly raised costa is seen in front of the shoulder near the base (female), which in the male insect is replaced by a longitudinal smooth space; the shoulders are prominent and swollen; the underside and legs are metallic blackish blue, but the sides of the abdomen are bright flavous, each segment having a black spot at the sides, the last segment with two central spots.

Of this large and handsome species several specimens were obtained; the elytral short costa in the female is very peculiar, and is followed at the sides below the shoulder by a short longitudinal groove, visible in both sexes.

PHYLLODECTA MULTIPUNCTATA, n. sp.

Metallic dark blue; the head and thorax closely punctured, elytra deeply punctate-striate, the striæ rather irregular, the interstices finely

punctured and somewhat rugose; margins of the abdominal segments fulvous; tarsi piceous. Length, $1\frac{1}{2}$ line.

Head distinctly and closely punctured; antennæ black, the basal two joints fulvous below, the third joint longer than the fourth and second joint, the terminal ones strongly thickened; thorax transverse, twice as broad as long, the sides nearly straight, the surface finely but rather closely punctured with an obscure central smooth narrow ridge; scutellum black, impunctate; elytra with deeply punctured striæ, which are occasionally doubled and distinct to the apex, the interstices very slightly raised, finely punctured, and at the sides slightly rugose; under side of a more dark greenish-æneous colour, with the extreme margins of the abdominal segments fulvous; tarsi piceous.

This species, although closely allied to several others, described by Motschulsky, seems to differ in the close punctuation of the thorax, the sculpture of the elytra, and the colour of the under side.

PAROPSIDES MACULICOLLIS, n. sp. (Pl. I., fig. 10.)

Fulvous; head black in front; thorax very closely punctured, the base, lateral margins, and a central stripe, black; scutellum black; elytra semi-regularly punctured, the lateral and sutural margins, a transverse band near the middle, another below the latter, and a longitudinal stripe at the shoulder, black. Length, $3\frac{1}{4}$ —4 lines.

Head very finely and closely punctured, black, the base with a fulvous spot; antennæ fulvous, not extending beyond the thorax; thorax three times broader than long, very finely and closely punctured, the sides with a small fovea, the disc fulvous, the sides broadly, and a narrow central longitudinal stripe black, the base with another black, medially widened transverse band; elytra with numerous rows of strong punctures, the interstices nearly as strongly punctured, the disc fulvous, the sutural and lateral margins narrowly black, a similarly coloured transverse band is placed near the middle, extending across the suture, where it is greatly widened; this band is joined by a longitudinal black stripe, extending from the shoulder downwards; another transverse narrow band, triangularly widened at its middle, extends across the disc below the middle; prosternum raised and truncate in front; breast and legs sometimes fulvous.

This species closely resembles *P. 12-maculata*, Geb., but is, I think, quite distinct, since the differences are constant in more than the fifty specimens which are contained in this collection; the colour of the thorax is different from that of the allied species, the pattern of the elytra partly resembles it, but the third transverse apical stripe in *P. 12-maculata* is absent in the present insect, the punctuation of the elytra is distinctly stronger, and the larger punctures are more regularly placed in rows.

PAROPSIDES (PHYTODECTA) NIGRO-SPARSUS, Fairm.

The description given by M. Fairmaire of this species surely proves that it cannot belong to the genus *Paropsides*; the triangularly dilated tibiæ and shape of the prosternum doubtless belong to *Phytodecta*, and Fairmaire's species seems to be identical with *Phytodecta 13-maculata*, Jac., described in the Proc. Zool. Soc., 1888, also from China; the only difference I can see is the absence of the lateral spots of the thorax in Fairmaire's species, and its somewhat larger size.

(To be continued.)

TWO SPECIES OF MICRO-LEPIDOPTERA NEW TO THE
BRITISH LIST.

BY J. B. HODGKINSON.

RETINIA MARGAROTANA, H.-S.

WHEN looking over my collection Messrs. Barrett and Webb detected the above handsome species among *Retinia pinivorana*. A few days afterwards I found a second example among my duplicate *R. pinivorana*. This specimen I took off Scotch fir on the moors above Stoneyhurst, in June, 1879; it is in fine condition, as also is the other, which I have no doubt was sent to me with *R. pinivorana* from the west of Scotland. 1879 produced several other novelties, such as *Coccyx scopariana*, *Penthina postremana*, *Nemophora pilella*, and *Trifurcula pallidella*.

BRYOTROPHA (GELECHIA) OBSCURELLA, Hein.

On July 5th, 1887, I took two fine specimens of this species in the vicinity of Windermere College. Mr. Stainton, to whom the specimens were submitted on two occasions, was unable to identify them. When Messrs. Barrett and Webb were here I showed them the species, but neither of these gentlemen could name it then. Subsequently I forwarded the specimens to Mr. Barrett, and suggested that, if they were not referable to any known species, he or I had better describe and name them: this latter course, however, was found to be unnecessary, as Mr. Barrett has determined them to be *Bryotropha obscurella* of Heinemann.

Ashton-on-Ribble, Feb. 16, 1890.

NOTES ON SILK-PRODUCING AND OTHER BOMBYCES.

BY ALFRED WAILLY.

DURING the last few years, having been absent from home from the beginning of August till the middle of September, my rearings of Silk-producing Bombyces and other Lepidoptera had to be discontinued at the end of July. But notes were taken, as usual every season, up to that time. Of Asiatic and North American species reared and mentioned in previous reports, nothing of importance can be stated. But after many years' experience I can now state that the following species, if protected from their enemies, can be reared in the open air even in England:—*Antheraea pernyi* (the North-China oak silkworm), *A. yama-mai* (the Japanese oak silkworm), *A. roylei* (the Himalayan oak silkworm), *Telea polyphemus* (polyphagous North

American silkworm), and *Attacus cynthia* (the Ailanthus silkworm). *Platysamia cecropia* (North American) might also be added: this species seldom succeeds in England in the open air, as it remains too long in the larval state before spinning, but in Central and South Europe it would thrive splendidly. It feeds on fruit trees and most forest trees. The larvæ of the first four species produce fine and excellent silk and form "closed" cocoons, the last two "open" cocoons. As I have mentioned *P. cecropia* I may, I think, be allowed to make a little digression.

Mr. T. D. A. Cockerell has published (Entom. xxii.) several interesting articles on the "Variation of Insects," and (page 177 of that volume) he invites those who possess dwarfed Lepidoptera to examine them and report on the sex. The paragraph referred to runs thus:—

"Lepidoptera may be dwarfed in captivity, by giving the larvæ an insufficient supply of food, and it has been stated that these dwarfs are generally of the male sex. Mr. T. G. Gentry (Can. Ent. 1877, 50) believed he could influence the sex of insects in this way, and out of twenty *Samia cecropia* so reared eighteen proved to be males. It would be interesting if all those who possess dwarfed Lepidoptera would examine them and report on the sex."

Now I quite agree with the first statement, that an insufficient supply of food will produce dwarfed individuals; but with respect to the second statement, that the dwarfs will generally be of the male sex, this I consider erroneous and only accidental. I never was more surprised than when I read that the sex of insects could be influenced in any way. It comes to this—that an insect which, with a sufficient supply of food, would have been a female, will turn into a male if kept short of food. In no other sense can I understand the statement. I have had considerable experience with the breeding of *cecropia* moths from cocoons received from North America. This year I received 1500 cocoons,—nothing compared with the number sent to me in 1878, which was 5500. For years I have had this species of *Samia*, and I never noticed that the number of male dwarfed specimens exceeded in any permanent degree the number of female specimens. Sometimes the males will predominate, and sometimes the females. This year a small number of *cecropia* larvæ were bred here in captivity, in Norbiton, by one of my neighbours, who brought me the thirteen cocoons obtained. All were very small, but male and female moths (about half the natural size, and even less) emerged from the cocoons, only one pupa having died. Of the American cocoons, not bred in captivity, but all collected in the country, a number of dwarfs were found, as is often the case; and male and female moths emerged from these tiny cocoons in about equal numbers. From a hundred *Callosamia promethea*

cocoons, all extremely small, again male and female moths emerged, about half the size of ordinary specimens. I do not know whether the larvæ of these *promethea* were bred in captivity, but I should think so considering their small size.

In nature, however, there are dwarfed individuals in all species of insects and other animals, and this has nothing to do with the quality or quantity of food consumed, as they live side by side with, and on the same food as, their brother giants. It is a freak of Nature, who delights in creating these dwarfs and giants, with all the intermediate sizes between.

With respect to small-sized insects, I may also say that I have frequently found small moths possessing more activity and vitality than larger ones, just as we find some small men stronger than big men.

Taking my leave of the dwarfs and the giants, I will say a word or two about young larvæ. My belief is that a larva, if it lives, must produce in course of time a male or a female perfect insect, *independently* of the quantity or quality of food it may have consumed. There are two different kinds of larvæ in each species. With some, size alone seems to be the only difference, but in others there is a marked difference; for instance, in *Actias luna* from N. America, the smaller larvæ in the first stage have longitudinal lines all along the sides of the body; the larger larvæ, on the contrary, are all pale green, without any markings at all. In all probability the larger larvæ produce the female moths, the smaller ones the males.

After this digression, of which I had not seen the length at the outset, I will pass to the remarks I have to make on the silk-producing Bombyces I received during the last few years.

From Assam every year, in winter and spring, I had large quantities of *Antheræa assamensis* sent to me, but never could obtain a single moth. This year over 400 were sent, all the moths having emerged on the voyage or died in the chrysalis. Some of the moths appeared to have emerged only a few days before their arrival, and this shows that there would be a possibility to receive the cocoons before the emergence of the moths, if they were sent in small boxes by *sample* post, going overland like the letters, instead of sending them in large boxes by *parcel* post, which takes a fortnight or more longer.

Another species, sent also from Assam, was *Attacus ricini*, the cultivated *A. cynthia*. This species is still worse to travel, the moths emerging in about a fortnight or three weeks; therefore the cocoons were tied to strings laid across the boxes, to give room to the moths to emerge, pair, and lay their eggs, but I found the young larvæ hatched and dried up.

To obviate this rapid emergence of the moths, my correspondent in Assam placed in some of the cases *A. assamensis* larvæ, which were just beginning to spin, thinking by so doing

that about a week would be saved. The experiment was a complete failure, but it has taught this lesson—that larvæ cannot live, or change into pupæ that will live, when they are travelling; the shocks experienced by the larvæ when travelling prevent them, first of all, from forming their cocoons properly, then the shakings kill the larvæ or newly formed pupæ; therefore I only found dead larvæ or dead pupæ in the cocoons.

In 1886 I received live cocoons of *Dirphia tarquinia* from French Guiana. This species is remarkable for the beauty of the perfect insect, but the cocoon—fusiform, or spindle-shaped, thin, and rather similar to, but larger than, that of *Lasiocampa potatoaria*—is useless as a silk-producer. From eighteen cocoons sixteen moths emerged between the 14th of July and the 17th of August. A pairing took place on the 4th of August, the female laying until the 8th of August 207 eggs. Only a few larvæ hatched, and they all died within a few days. I have here to remark that if pupæ from hot countries are considerably delayed in producing their moths in consequence of a great change of climate, the moths, although the pairings take place, and although they seem perfectly healthy, lay eggs that are not fertile, as a rule. Being months instead of weeks before they emerge, the moths of these tropical regions seem to have lost their vitality and power of reproduction. Besides, a considerable number of these tropical species die in the pupa state, when the heat is not sufficient to allow the moths to emerge just at the time they are ready to make their appearance.

Tudor Villa, Norbiton, Surrey.

NOTES ON DIPTERA, IN 1889.

By E. BRUNETTI.

THE time I was able to devote to collecting last year was again exceedingly limited, and most of the following notes refer to specimens sent me by correspondents for identification. It will be seen that I am able to introduce a few new species,* and as these have been captured by collectors who have only recently taken up the study of this order, I trust it will be sufficient encouragement to others to turn their attention to the Diptera, where even beginners can render so much assistance.

The new species referred to are the following:—

Psilocephala ardea, F. Birmingham; taken by R. C. Bradley.

Lasiops semicinerea, Wied. Birmingham; taken by R. C. Bradley.

* By a new species I mean a species not given in Mr. Verrall's recent list, which may be taken as a basis for all future catalogues.

Leria ruficauda, Zett. Reading; taken by E. Brunetti.
Heteromyza atricornis, Mg. Aberdeen; taken by E. Terras.
Sapromyza platycephala, Loew. London; taken by E. Brunetti.

Cecidomyiidae.

Cecidomyia destructor, Say. One specimen sent me from Alford (Lincolnshire) by Mr. Mason; bred by him from puparia collected in that locality during the autumn of 1888. Owing to mould, I believe only one specimen emerged, but this is, to the best of my belief, *C. destructor*, the "Hessian Fly."

Mycetophilidae.

This is a group I have not worked at, so I have been unable to identify the few examples that have passed through my hands.

Bibionidae.

About eight common species have been sent me, none calling for any special remark.

Psychodidae.

Psychoda sexpunctata, Curt. From London in June and July; also the common *P. phalaenoides*.

Tipulidae.

Dicranomyia dumetorum, Mg. London, early in May; abundant for two or three days, since which time occasional specimens have appeared. I have two other species of this genus, one from London, the other from Staines.

Erioptera flavescens, Mg. Hastings, Aug. 28th.

Stratiomyidae.

Chrysonotus bipunctatus, Scop. One specimen of this rather rare species was taken by Mr. Tumaley near Birmingham.

Beris morrisii, Dale. Dover.

Xylophagidae.

Xylophagus ater, F. One specimen of this rare species was sent me by Major Yedbury, taken at Plymbridge, May 16th.

Tabanidae.

Several common Tabanidae and Leptidae have been sent me.

Asilidae.

Isopogon brevirostris. Ivybridge, June 16th; Cornwood, June 2nd.

Bombilidae.

Bombylius major, L. Maidstone, June 2nd; Westerham, April 23rd.

B. discolor, Mik. Dover; Maidstone. May and June.

Therevidæ.

Psilocephala ardea, F. One specimen of this species was taken by Mr. Bradley at Wyre Forest, near Birmingham, on July 7th. This species is new to the British lists.

Thereva plebeia, L. (*lugens*). Dover.

T. fulva, Mg. Dover.

Scenopinidæ.

Scenopinus fenestralis, L. One from Birmingham. Last year I took several in London, but this year not one has appeared, though its natural habitat seems to be houses.

Empidæ.

Empis lucida, Zett. Aberdeen. Not a common species, though it seems to have been common there.

Hilara maura, F. This species swarmed over a sheltered stream at Staines on May 23rd last. I took over 1200 specimens in a quarter of an hour, two or three strokes of the net being sufficient to obtain a solid mass of flies at the bottom of it.

Tachydromia candicans, Fall. Dover.

Dolichopodidæ.

This group I have not studied, but I have recognised

Dolichopus brevipennis, Mg., from Birmingham.

Pecilobothrus nobilitatus, L. Wimbledon, July 12th; not uncommon over one clump of bushes.

Argyra diaphana, F. Birmingham.

Lonchopteridæ.

Lonchoptera lutea, Pg. Wimbledon, July 12th.

L. flavicauda, Mg. Staines, May 23rd.

? *L. trilineata*, Zett. I took several specimens at Wimbledon on July 12th of what appears to be this species. Mr. Verrall does not give it in his list as British, so I should not like to answer for its correct identification.

Syrphidæ.

Pyrophæna rosarum, F. Birmingham.

Xanthogramma citrofasciatum, DeG. Maidstone.

Ascia podagrica, F. Dover. A specimen from Staines appears to be *A. dispar*.

Volucella inanis, L. Three from Birmingham.

Sericomyia borealis, Fall. Birmingham.

S. lappona, L. Ivybridge, May, June.

Eristalis horticola, DeG. Plymouth, May 21st—July 4th.

Criorhina oxyacanthæ, Mg. Birmingham.

Xylota abiens, Wied. One specimen of this rare species from Birmingham.

Chrysochlamys cuprea, Scop. Hastings; Dover.

Chrysotoxum bicinctum, L. Birmingham.

C. sylvorum, Mg. Dover.

C. 8-maculatum, Curt. Plymbridge, June 25th.

Microdon devius, L. Birmingham. In Verrall's list this is marked uncertain. As three specimens were taken this year, this will satisfactorily establish the species as British.

Conopidæ.

Conops vitellinus, Loew. Three from Birmingham.

Æstridæ.

Gastrophilus equi, F. One from near Birmingham.

Muscidæ.

1. *Tachinidæ.*

Echinomyia grossa, L. Ivybridge, Aug. 11th.

2. *Sarcophagidæ.*

Theria muscaria, Mg. I named a specimen of this species for someone early in the year, but cannot recall my correspondent's name, and I see the species has been recently introduced to our lists by someone, so that in this instance I am forestalled. In Verrall's list it is included among the "probably British" species. Walker does not mention it.

Cynomyia mortuorum, L. The Rev. F. Walker showed me a long series of this fly, taken in Iceland, where he found them lying dead near the windows inside a large building,—if I remember rightly, a church.

3. *Muscinæ.*

Calliphora vomitoria, L. Aberdeen; London. Dr. Walker has taken it in Iceland. The very common species *erythrocephala* is usually mistaken for this species.

C. grænlantica, Zett. Birmingham. Dr. Walker has taken it in Iceland. I have not seen a specimen of this species in London this year, though I took several here in 1888.

4. *Anthomyidæ.*

Lasiops semicinerea, Wied. One taken by Mr. Bradley near Birmingham. This appears to be new to Britain, not being in Verrall's list; but Walker, after his described species of *Anthomyia*, adds, with others, an *A. semicinerea*, Wied. The species is so distinct that it cannot possibly be mistaken.

Lispe tentaculata, De G. Plymouth, August 12th.

5. *Acalypterata.*

Norellia spinimana, Fall. Staines, May 23rd.

Scatophaga squalida, Mg. Aberdeen.

S. stercoraria, L. Dr. Walker found it common in Iceland last summer.

Leria ruficauda, Zett. This species, named for me by Dr. R. H. Meade, is new to Britain. I took one specimen at Reading on May 5th.

Orygma luctuosum, Mg. Salcombe, July 7th, under sea-weed.

Cœlopa pilipes, Hal. Folkestone; Dover, Nov. 2th.

C. frigida, Fall. Scotland, Feb. 22.

Heteromyza atricornis, Mg. One specimen from Hazelhead, near Aberdeen, taken on May 15th by Mr. Terras, is certainly this species, which Mr. Verrall gives as a reputed species.

Spilographa zoe, Mg. Birmingham; London, July 11th.

Tephritis matricariæ, Lw. One specimen taken by Mr. Hall at Dover, in June, appears to be this species, though the wing-markings do not exactly correspond with Loew's photographic illustrations. It is not in our British list, though it is fairly common on the Continent, and I should not like to introduce it on the evidence of one rather doubtful specimen.

Palloptera parallela. Mr. Hall took one at Dover in July. If correctly identified, this species is new to our British list.

Sapromyza platycephala, Sw. I have taken several specimens of this species on the windows of my house in London. It was identified for me by Dr. Meade, and is new to the British list.

Limosina spp. During June and July I took a good number of specimens, representing at least five or six species, but I should not like to answer for the correct identification of any of them. They appear, however, to be *L. sylvatica*, Mg.; *crassimana*, Hal.; *pusilla*, Mg.; *fenestralis*, Rond.; and *cilifera*, Rond.—the three latter names not being in Verrall's list. As *cilifera* was named for me by Meade, it is probably correctly identified, and it is an addition to the British list.

Phoridae.

I have taken in London, during June and July, eleven specimens of a small *Phora* I do not recognize; and have one from Kincardine, taken on June 1st, that appears to be *P. nigricornis*, a species not given in Mr. Verrall's list.

Trineura aterrima, F. London, June 1st; Birmingham.

Hippoboscidae.

Hippobosca equina. New Forest.

129, Grosvenor Park, Camberwell.

SUGARING.

By W. H. BLABER.

THE question of the frequent failure of "sugar" in attracting moths, and what are really the requisites for a successful "sugaring" evening, has of late been much in my mind, and I

was therefore interested to see a note on the subject by Mr. Anderson (Entom. xxiii. 66). The most successful evenings that I have experienced have generally been very warm and close, with heavy, dark clouds, and now and then a few drops of rain; and I remember that one of my very best evenings, which was in August, 1886, had been preceded by a warm day with frequent showers of rain, while the pitchy darkness of the night was rendered all the more noticeable by flashes of summer lightning in the distance. On this occasion moths simply swarmed on the patches of "sugar," and not only there, for numbers were crawling about at the foot of the trees, and as many again kept flying round my lantern. Yet, on the other hand, I have frequently set out on what appeared to me to be a perfect evening for "sugaring," anticipating a numerous gathering at the trees, when, to my disgust and amazement, only two—or perhaps three—moths have deigned to put in an appearance. I believe that some collectors attribute this failure of "sugar" to the somewhat cold and wet summers of the last few years, and I have no doubt but that this has a good deal to do with the matter; but still the summer of 1884, for instance, was extremely hot, and, although I was out night after night, I was far from successful.

The next year, 1885, was also unusually warm, and with the exception of one or two evenings the majority were dead blanks; while in 1886, which was dark and sunless on the whole, I had some most productive "sugarings." It would therefore seem that very hot weather affected the question but slightly, and I have often found that a continued drought is most conducive to the absence of moths, while, on the other hand, I am convinced that much cold and damp, such as was experienced last summer, must have had a most deterring influence upon the emergence of many species of Noctuæ. It appears to me that, however favourable a particular evening may seem, the captures will be *nil* unless the previous fortnight or three weeks have been mild for the time of year, with perhaps a few warm showers of rain, but, above all, an entire absence of cold east winds, so that the moths may have had as favourable a time as possible for emergence. I have hardly ever noticed moths at sugar, however plentiful they may have been previously, if there is the slightest suspicion of an east wind, and I think, therefore, we may presume that on such occasions they do not venture forth from their hiding-places. The last few summers have certainly been most changeable, with much rain and wind: what, for instance, could we expect after the terrific gales and continuous rain of last July and August? I was on this account not altogether surprised, when I visited the New Forest, to find that moths were not to be obtained at sugar, however often one went out for this purpose, for in spite of apparently good evenings there was a certain chill and dampness in the air.

Two other reasons for failure at sugar have also suggested themselves to me, namely, the increasing mildness of our winters, and the frequent gales and heavy rains in the spring. In the first case it seems to me that numbers of larvæ must hatch from the egg long before there is the slightest chance of their obtaining their particular food, and these therefore doubtless perish in large quantities; and secondly, those larvæ which are still small must often be washed off their food-plants and drowned, or are blown from the trees by the strong winds, only to die of starvation. The question is an interesting one, and I therefore hope, with Mr. Anderson, that we may see the opinions of some of our leading entomologists on the subject.

Groombridge, Sussex, Feb. 18, 1890.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

BY F. H. PERRY COSTE, F.C.S.

PRELIMINARY NOTICES.

I.

THE experimental investigation of the chemical characters of those colours whose superb brilliancy or delicate tones, as displayed in tens of thousands of insects, never fail to evoke our enthusiastic admiration and afford us a source of unflagging delight, might, indeed, be thought to offer an enticing field for scientific research. Reasoning deductively, and as merely entomologists, from the data afforded us by the colour variations occasional in all insects; by the different forms that the same species may take in different countries; by the existence of intermediate* species, forming a connecting link between two quite differently coloured species; by the comparison of allied species in which similar markings are dissimilarly coloured; and lastly, by the actual evolution of colour in the same individual insect that we can occasionally observe;† reasoning, I say, from all these data alone, we may draw certain conclusions as to the evolutionary rank of some insect colours. Notably is this possible with regard to reds and yellows; and the views already advanced, for instance, by Mr. T. D. A. Cockerell, in the pages of the 'Entomologist' and elsewhere, will be found anon to be confirmed by the results of direct experiment. But this question of the evolution of red colour in insects was, perhaps, the plainest sailing of all; true we may farther proceed to theorise on the relations of yellow and white, but here the way is apparently not so clear; and the danger of resting satisfied with theoretical results, *unverified*, however satisfactory they seem, becomes soon

* I speak here of colour only.

† *E. p.*, in the newly emerged imagines of *atalanta* and *caia*.

evident. For although, for my own part, I had always inclined to the view that I now find supported by the experiments presently to be described, yet an entomologist who has devoted so much thought and study to the question as has Mr. Cockerell, arrives at an exactly opposite conclusion to my own concerning the developmental relations of these two colours yellow and white. This at once illustrates the necessity of seeking direct experimental evidence as to the correctness of our theories; and it is not a little astonishing—in view of these considerations—that up to the present this work has been left almost wholly untouched, and a masterly inactivity allowed to prevail in this quarter. So far as I can understand, the chemical behaviour of these colours is veiled in an unlifted cloud of darkness, broken only by the light of some half dozen statements, which are either vague, misleading, or incorrect. For instance, Mr. Wallace* states that the red of *Zygæna* is changed to yellow by muriatic acid, whilst that of *V. atalanta* undergoes no such change; a statement of which the first half is certainly quite correct, but the second half very misleading. Again, there is a general statement that the white of butterflies may be turned yellow by alkalis—a statement based on an experiment of Mr. Coverdale's: so far as made concerning *Pieris* it is utterly erroneous. This has already become known to Mr. Cockerell, who remarks† that “alkali will not turn a *Pieris* white to yellow.” He nevertheless makes himself responsible for the statement that the white of several species of Lepidoptera may be changed to yellow by alkalis,‡ a statement that demands careful qualification. And lastly, Mr. Cockerell states that the yellow of a *Colias* was changed to red by potassic cyanide; a phenomenon so extraordinary, and so utterly opposed to every experimental result yet obtained by me, that I must be pardoned for emphatically discrediting it; at least unless Mr. Cockerell can personally vouch for the fact.

This then, so far as I am aware, is the extent of our experimental knowledge of the subject up to the present, and there is very evidently abundant room for research. At last, too, interest appears to be awakening, and as generally happens in such cases, several workers are moving simultaneously. Both Mr. Cockerell and myself would appear to be (quite independently) interesting ourselves in this subject; and the colours of the Echinoderms, Worms, Ascidians, Crustacea, &c., form the subject of a most elaborate spectroscopic research just recently communicated by Mr. MacMunn to the ‘Quarterly Journal of the Microscopic Society’; whereas the colours of plants and flowers have long since been investigated by Sorby, Hansen, Bachmann, Pringsheim, Weiss, Church, and various others.

Now before proceeding further I must disclaim any originality in the first inception of the idea of investigating these insect

* ‘Tropical Nature,’ † ‘Entomologist,’ xxii. 126. ‘Entomologist,’ xxii. 2.

colours. Starting from the first idea, I have been led to others suggesting several lines of investigation which I *can* fairly claim as my own,—at least in this sense, that I do not owe them to others, although very possibly others may have been led to the same ideas; with these I hope to deal further on. But this subject itself was first suggested to me by the remark of Wallace's that I have already quoted. I was reading 'Tropical Nature' some three or four years ago, and, being struck by the statement, made a note of it as a hint for future research. Owing to press of other work, however, my good resolutions were indefinitely postponed, and finally slumbered in forgetfulness. Some time since I came upon my old memorandum of the subject, and my attention was redirected thereto. Although still too busy to spare time for the work, I kept it in mind; and while yet thinking it over, a fresh impetus was indirectly given to my interest in the matter by Mr. Cockerell's article in the 'Entomologist' of January, 1889. Soon afterwards, before commencing any experiments, I wrote out at some length my *à priori* views on the subject, and the lines of investigation proposed to be followed, as well as the classes of results that I anticipated; from this statement I shall have directly to quote some passages. During the spring I commenced a few preliminary experiments, but want of time prevented me doing much just then; and it was not until September that I was able to settle down into regular work. Since then I have been following up the subject, but lack both of time and opportunity have still conspired to prevent any rapid progress. This may be readily understood when I say that daylight is essential to this work, and the only possible opportunity of daylight working that I have is on Sunday mornings; most of these since August I have given up to the work, and have already got through many hundreds of experiments.

All of these, however, I regard as merely a preliminary exploration. I have now fairly satisfied myself as to the methods and reagents likely to prove serviceable, and am not without hope of soon being in a position to communicate the results of a very extensive series of investigations. So far as I can at present foresee, I anticipate having abundant time and opportunity for this work after next autumn onwards, and nothing will then be wanting me but *material* in the shape of insects.

The results already arrived at, although confined entirely to British insects, and therefore covering a very small field, I am, nevertheless, induced to publish without further delay, and that for several reasons. In the first place, they are, so far as they go, fairly complete; and although—since most of my results are negative—very disappointing compared with my *à priori* anticipations, yet they may at least guard any future worker from losing time in experimenting with useless reagents or on immovable colours.

Secondly, since I do not know whether any others might presently take up the inquiry, I—not unnaturally—wished to establish my priority if possible; and I now appeal to any of my readers who have *not* yet worked at this, to leave me alone for two or three years to carry on what I have begun. This is universally conceded by the scientific code of honour to every worker on a new line, and I must ask the customary honourable treatment of being left to finish my work myself. Of course if any others, as for instance Mr. Cockerell, have already struck out the same line of work as myself, that is quite another thing; and although I shall, naturally, be disappointed to find myself not alone in the field, yet evidently their right to continue the investigation is every whit as good as mine, and the mere priority of publication does not entitle me to cry “hands off!” In such case we can only continue our collateral investigations in friendly rivalry. But I do emphatically reserve my rights as against any who might have their attention directed to the subject by merely reading this communication.

And, thirdly, there is a very practical inducement to make known my present results, for I am most anxious to, if possible, examine the colour of typical Lepidoptera of all the chief families, and from all parts of the world, so as to arrive at a fairly comprehensive conclusion concerning the chemical and genetic relationships of these colours. It has therefore appeared to me not improbable that many entomologists whose interest in Lepidoptera is not confined to merely collecting them, but who rather regard the study from the scientific standpoint, might feel inclined to assist me by sending material for my investigations. I have myself none but common English species, and therefore all brightly coloured Lepidoptera, whether European or tropical, will be most welcome. To obtain the supply that I want from dealers would be practically impossible, and furthermore extremely wasteful; for working as I do, such very small portions of the wing are used in each experiment, that a *single wing* of *e.g. atalanta* size would, if unicolorous, amply suffice for my experiment on that species.*

Now there must certainly be numbers of entomologists possessing damaged and broken specimens that are useless for their cabinets and exchanging: if they will send me a wing or two each

* Where the wings are mottled with several colours, of course *one* wing of this size would not suffice. Any insects thus sent me will need no packing, but may be sent in simply a stout envelope; since the preservation of the body is unnecessary, the most convenient mode would be to send simply *detached* wings. To be of real service all should be *named*, at least so far as regards genera and family, the specific name is of less account; and I would greatly desire the locality (Asia, Africa, Europe, &c.) to be stated. It must be remembered, however, that a wrong naming will be far worse than none at all; and in any case of even uncertainty, it will be better to let me take my chance of getting the insects named at the Museum or elsewhere. All such enclosures may be addressed to me at “Ravenshoe,” 142, Burnt Ash Hill, London, S.E.

of such specimens, I shall feel immensely indebted to them, and think I can promise that such kindness will not be wasted. Now this appeal I could not well make without first showing "cause why"; but I hope that the preliminary results to be detailed will be held to constitute sufficient justification for my request, and to exonerate me from my charge of presumption in making it.

I might also add that it is not my wish to stop short at the colours of the lepidopterous imagines, but I hope further to examine somewhat the colours in Coleoptera, Neuroptera, &c., and also in the *larvæ* of Lepidoptera. This last will be an especially interesting investigation in every way. For instance, will there be found a clear relation between the chemical character of the larval and imaginal colours in each species? or will the larval colours in any genus be related *inter se*, as those of the imagines, but independent entirely of the latter? and what differences may not arise from the fact that in the imago of the Lepidoptera the colours are on scales, whilst in the *larvæ* on hair and skin, in the Coleoptera on horny elytra, and so on? These hints are merely indicative of the interest presumably attaching to such an enquiry.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

ON THE IDENTITY OF *DIANTHÆCIA CARPOPHAGA* AND *D. CAPSOPHILA*.—In the March number of the Ent. Mo. Mag. Mr. W. F. H. Blandford shows good reason for sinking *D. capsophila*, Dup., as a species, and reducing that insect to its proper rank as a local form of *D. carpophaga*, Bork. At a meeting of the South London Entomological and Natural History Society in 1888, I read some notes on *D. nana*, Rott. (= *consersa*, Esp.), and *D. compta*, Fab., and at the same time made some remarks on the probable consanguinity of those insects. In the discussion which followed, other species of *Dianthæcia* were adverted to, and I incidentally expressed an opinion that *D. capsophila* and *D. carpophaga* were specifically identical. This view I had long entertained, and the better I became acquainted with the various forms of the latter insect, so much the more was I convinced that *capsophila* was only a specialised form of it. Four or five years ago, Mr. Blandford very kindly gave me two specimens of a *Dianthæcia* he had obtained in South Wales. As regards colour these specimens are not exactly like any example of *D. capsophila* or *D. carpophaga* in my series of these insects; but as Mr. Barrett has pointed out (E. M. M., 90), there is not the slightest difference in the character of markings, and in this respect they agree with both *capsophila* and *carpophaga*. This is a fact which Mr. Blandford may remember I called his attention to when he compared his insect with my *Dianthæciæ*. It should be added that there is no character in the larva of *capsophila* which will serve to specifically distinguish it from that of *carpophaga*.—RICHARD SOUTH.

DIANTHÆCIA CUCUBALI, &c., IN AUGUST.—I find, on referring to notes, that whilst in Gloucestershire, on the Cotswolds, last season, I took at

sugar on August 19th a freshly emerged specimen of *Dianthæcia cucubali*, and on August 30th I captured a solitary specimen of *Emmelesia albulata*, disturbed from amongst a great quantity of its food-plant, the yellow rattle. Would these be deferred emergences or a second brood?—T. B. JEFFERYS; Bath, March 5, 1890.

[*D. cucubali* has been taken and bred in August, and *E. albulata* captured in September. *Vide* Entom. xiv. p. 214; vi. p. 429.—ED.]

ABUNDANCE OF *VANESSA CARDUI* IN NEW ZEALAND. — Since my last note (Entom. p. 20), I have observed *Vanessa cardui* in increasing numbers. During October I saw over six specimens in different localities near Wellington; while on Nov. 3rd sixteen or seventeen specimens were to be seen in openings in the forest near Karori. I also observed several of these butterflies in the middle of the month, during a brief stay at Palmerston North, a locality some eighty miles to the north of Wellington. In England I believe it is the fashion to attribute the sudden appearance of certain species of insects to migration from the Continent of Europe, but in New Zealand such explanations are obviously quite untenable. I am inclined to believe that the abundance, or the reverse, of a given species, is largely determined by certain conditions of existence, with which we are at present most imperfectly acquainted, and that in the case of a periodical insect like *V. cardui*, these conditions only recur occasionally, the species being so extremely rare during the intervening seasons, that it altogether escapes our observation. It is, of course, almost certain that insect migrations sometimes occur, but we should always remember, that in animals endowed with such enormous reproductive powers as insects, any circumstance tending to lessen the rate of mortality in a given species, would at once cause its numbers to increase with almost incredible rapidity.—G. V. HUDSON; Wellington, New Zealand, November 20, 1889.

TEMPERATURE AND MELANISM.—At a meeting of the Entomological Society, on December 4th, Lord Walsingham stated that forcing pupæ produced in the imago a result the opposite of melanism. According to the theory I have advocated (Canad. Ent. 1888, p. 86), such colour-changes are more strictly connected with the rate of development than with heat or cold as such. If so, forcing throughout the whole or a large part of an insect's life as a pupa ought, as stated by Lord Walsingham, to produce the reverse of melanism; but if an insect is subjected to great cold throughout the winter, and suddenly to great heat in spring, it ought (according to my theory), as a rule, to show some tendency towards melanism. Now many of your readers breed Lepidoptera; will not some one try some experiments to prove the point? An experiment which might be tried by any breeder of Lepidoptera this spring is as follows:—Take pupæ which have hibernated, and about a fortnight before the normal time of emergence transfer them to a hot-house, or to some heated place. This might bring the imagines out a few days earlier; but as the pupæ wintered in the mild English climate, I should doubt whether it would produce any perceptible effect on the colouring of the insects. But should it produce any effect, a melanic or dusky tendency would be favourable to my theory, while the opposite tendency would seem to contradict it. These "temperature-forms" are rather fully discussed in Entom. xxii. 27—29, to which I would refer the reader. Temperature "melanisms" are generally small, greyish, suffused or dusky, and yellow and other bright colours are paler or partly

suppressed, though there may be a tendency to pink. Ordinary melanic races, such as occur in the North of England, seem to be entirely different, and due to different causes.—T. D. A. COCKERELL; February 26, 1890.

PHIGALIA PEDARIA (PILOSARIA) IN JANUARY. — As an example of the effect of the mildness of January, I may mention that I captured a male *P. pedaria* on the night of the 11th of that month, at 8.45, the temperature being at the time 50°. It was at rest on a gas-lamp (at Balham), and apparently quite recently emerged. Upon referring to my notes of the last ten years, I find the earliest date I had hitherto taken this species was on February 19th, 1881, and that the first week in March is the usual time for its appearance.—F. W. FROHAWK; Balham, S.W.

During a short walk on January 26th, I took five *Phigalia pedaria* and half a dozen *Hybernia leucophaëaria*, at rest on the sheltered sides of fences, excellent evidence this of the mildness of the season; we have March in January.—F. W. BIDDLE; Lanherne, Albemarle Road, Beckenham.

Phigalia pedaria has appeared here very early this year. I took seven specimens on January 16th. The earliest date at which I have previously seen this species is February 16th.—WM. REID; Pitcaple, Aberdeenshire.

[The usual time for the appearance of this species is perhaps between the middle of March and the middle of April, but it has been observed as early as November and December, and so late as the middle of June. *Vide* Entom. xx. pp. 64, 110; xxi. p. 91; xxii. p. 118.—ED.]

ARCTIA CAIA.—I found some thirty larvæ at the beginning of June last year, and as I had heard that feeding them on coltsfoot produced the best varieties, I reared them on this plant alone, but of the imagines bred therefrom not one was a variety. Two of the females deposited ova, and when they hatched I gave the larvæ lettuce that was seeding to feed on. This food getting scarce when they were about half-grown, I fed them on a weed that grows among the turnips; the farmers call it "rednees," a species of *Persicaria* I suppose it is; and they fed on it ravenously. Some two hundred of them refused to thrive, and I planted them out to hibernate. About 200 insects emerged; a great many were cripples, but 50 of the specimens were good varieties: hind wings buff to very dark brick-red, approaching a suffused smoky colour; some have beautifully marked fore wings. On the whole I am very well pleased with the result.—WILLIAM JOHNSON; Bank-houses, Aspul, near Wigan.

GAS-LAMP ENTOMOLOGY.—As a doubt appears to exist in the minds of some entomologists as to whether the Sphingidæ are prone to the attractions of the gas-lamp, the following incident may be worth recording. It is some years since I systematically worked the lamps, but I well remember an occasion, when having spent the evening in mothing along the hedge-rows of what was then known as Burnt Ash Lane,—possibly one of the best suburban hunting-grounds in the district,—and darkness having some time set in, I was preparing to work the gas-lamps on my way home. The first few of these stood well out in the open, and on approaching number one I beheld what had the appearance of a bat suspended from the top rail of the frame, but on going forward to secure my prize found, instead of the bat, a couple of *Smerinthus populi* hanging on to the iron, side by side, within an inch of each other; on the next lamp visited was another; and on the next, a fourth;—all within a distance of some hundred

yards. My own experience is that it would be much more difficult to say which families are not attracted by gas-lamps than which are, even such sun-loving species as *Pieris rapæ* and *Vanessa atalanta* having been found in such situations, the fact of their returning after being driven away proving, I think, that the bright flame had some fascination for them. A word as to time: some species of moths will, doubtless, come to light even before the twilight has died away, but it is not until darkness has long set in that lamping becomes profitable; and if we are content to spend the still, small hours of a warm dark morning in searching the gas-lamps in any suitable locality, we are not likely to return home with many empty boxes; not only are moths then more common than in the earlier part of the evening, but are more easily secured.—R. ADKIN; Wellfield, Lewisham, March, 1890.

There are a few very curious facts in Mr. Arkle's article (Entom. 100), under the above heading, which appear (if correct) to show the habits of Lepidoptera in the vicinity of Chester to be peculiar to that locality. I think every collector of experience will admit that nearly all the nocturnal flying Sphingidæ are attracted by light: *atropos*, *convolvuli*, *galii*, *livornica*, *celerio*, *elpenor*, *ocellatus*, *populi*, and *tiliæ* are well-known examples, and *Smerinthus populi* is often very abundant. The *Tæniocampa* in this district are common visitors to the lamps, especially *T. gothica* and *T. instabilis*; *Plusia gamma* is generally abundant, and *Dicranura vinula* not scarce, the latter sitting on the ironwork of the lamp like many other large species; *Spilosoma fuliginosa*, although by no means common here, turns up sometimes at light; and *Hepialus lupulinus* is a pest, both in rooms and at the street lamps. Some of the appearances are also a little peculiar at Chester. I see Mr. Arkle takes *Diurnea fagella* and *Lemnato-phila phryganella* at light in July; we take the former here in March, April, and May (male). Its popular name used to be the March-dagger. The latter flies in our woods in November. I see *Tortricodes hyemana* occurs at light at Chester in August. This is worth noting, for with us it is one of the earliest species to occur in our oak woods, and is over by the end of April. Mr. Arkle's list is long, but, including Tortrices, I think most metropolitan collectors could easily double it. It is astonishing what species come to light when that means of capture is steadily worked. I have taken day-flying insects, like *Acontia luctuosa* and *Saturnia pavonia* (*carpini*), in this way; and on one memorable evening, I had forty-one species present themselves between 11 p.m. and 1.30 a.m.—C. FENN; Evenden House, Burnt Ash Hill, Lee, S.E.

During several years' experience, I have never seen a single species of the Sphingidæ at lamps. To the lists already given I can add *Dasypolia templi*, *Xylina semibrunnea*, and *Eucosmia certata*. I have seen both *Tæniocampa gothica* and *stabilis*, as a further proof that some of the *Tæniocampa* are attracted by light.—T. B. JEFFERYS: Bath.

EARLY EMERGENCE OF *S. BILUNARIA*.—On the 30th January I chanced to go into the cold saddle-room where I keep my pupæ, and found, to my astonishment, that a male and female of the above had emerged. Before their wings had dried they paired, and on the following day the female laid eggs, which are apparently fertile. Subsequently others emerged, as follows:—February 2nd, one female; 3rd, one male; 6th, one female; 7th, one female; 13th, one female; 14th, one male. Newman gives April as the date of emergence! As a further instance of

this very mild winter, I may add that in the neighbourhood of Weymouth to-day I saw a swallow in full bloom.—CHAS. E. PARTRIDGE; The Castle, Portland, February 14, 1890.

AGROTIS ASHWORTHII Doubl. = A. CANDELARUM, Stdgr. — Mr. W. Gardner is justifiably enthusiastic over the beauty of *Agrotis ashworthii* (Entom. p. 5), but as to its individuality it must be confessed that it is generally admitted to be merely an illustration of the melanism, so commonly occurring in Great Britain, of common Continental species, and by no means entitled to rank as a separate species. The typical representative *A. candelarum* Stdgr. = (*candelisequa* Hb. 397), is of no rare occurrence throughout Europe. — N. F. DOBRÉE; The New Walk, Beverley, E. Yorks, February 3, 1890.

LARVÆ OF BOMBYX RUBI.—On the 1st December I found several larvæ of the above, at an altitude of 1100 feet, crawling on the heather amongst the unmelted snow, though there was no sunshine, and we had had a week's hard weather. Again on the 15th, on the same ground, I found larvæ, after an exceptionally wet and rough week. Surely this is unusual? —CHAS. PARTRIDGE; Farchynys, Dolgelly.

VANESSA IO AT CHRISTMAS.—Whilst walking about the New Forest, last Christmas Day, I had the pleasure of watching a specimen of the above butterfly on the wing; it sported about ivy for some time, but did not settle upon it; eventually it espied me, and alighted upon the trunk of an oak, within a foot of my head, fanning its beautiful wings, in which position I left it. There were numerous hollies around, looking so fresh and green, and the weather being simply glorious, that really *io* did not look out of season.—J. HY. FOWLER; Ringwood.

VARIATION IN SIZE OF COLEOPTERA.—In connection with the variation in size of certain species of Coleoptera, mentioned in Mr. Cockerell's recent papers on variation (Entom. xxii. p. 245), it may be of interest to record the following measurements of two species in my collection, which I think are unusually divergent in size for specimens of the same insect taken under almost identical conditions:—(1.) *Lasiorynchus barbicornis*, male 34, 24, and 11 lines; female, 21 and 14 lines. (2.) *Æmona hirta*, female, 12 lines, male, 9 and 5 lines.—G. V. HUDSON; Wellington, New Zealand, November 20, 1889.

EARLY APPEARANCE OF HYBERNIA MARGINARIA, &c.—Myself and a friend have taken the following moths this year; and as some of them are much earlier than I have ever taken them before, I thought it would be of interest to some of your readers. January 10th, *Hybernia rupicaprararia*; 31st, *Anisopteryx ascularia*. February 1st, *Hybernia marginaria* (*progemmaria*). I may add that we also took nineteen *Phigalia pedaria* (*pilosaria*) at lamps, January 31st.—W. E. BUTLER; 91, Chatham Street, Reading, February 14, 1890.

As an evidence of the great mildness of the month of January, my son took a fine specimen of *Melanippe fluctuata* in our garden on the 2nd of this month. I think this is an unusually early capture of even this very common species. It may interest your readers to know that last season I took a specimen of the black form of *Hemerophila abruptaria* in this neighbourhood.—DOUGLAS A. ONSLOW; 28, Carlton Hill, N.W., Feb. 22, 1890.

ANGERONA PRUNARIA.—Owing to illness since 1887 I have been unable to continue the experiments shadowed forth in my article (Entom. xx. 36), and, as I do not see any likelihood of my resuming them, perhaps some other entomologist will kindly take up the subject and render it more justice than I have been enabled to do. I have, however, managed to rear a few more notable aberrations of *prunaria* described below, viz., a speckled variety of the male with irrorated spots on basal half of hind wings, suffused, forming a sooty blotch; a palish example of the banded variety of the male, with hind wings, colour and markings resembling the ordinary female variety; and a specimen of the common type of the female form of a very pale straw-colour, with a few indistinct spots of the palest orange chiefly at costal and outer edges of wings.—GEO. J. GRAPES; Berkeley Villa, 34, Charlwood Road, Putney, S.W., February 6, 1890.

CHCROCAMPA CELERIO IN QUEENSLAND.—This insect is fairly common here, and it is, I think, interesting to note that the imago appears in September (our spring) and October. The larva occurs in the following month, and feeds up very rapidly; all mine had pupated before the end of November. A green variety of the larva is found commonly, as in the case of *C. porcellus* and *C. elpenor*. Here the larva feeds on grape-vine, a species of wild vine, and on fuchsia. I send this note, because I see that Mr. Hellins, in Buckler's 'Larvie,' only mentions vine as food-plant, while only the brown variety of the larva is figured. To the accuracy of that figure I can bear testimony.—(Rev.) C. D. ASH; Southport, Queensland, Dec. 16, 1889.

Is **CÆNONYMPHA ARCANIA**, Linn., a CASUAL VISITOR?—On overlooking a cabinet containing *Rhopalocera* collected by me when a boy, and which had not been added to or even opened, except to add fresh camphor, for nearly twenty-four years, I found two specimens of the above-mentioned insect. I cannot account for their presence in my cabinet, except that I may have caught them, not knowing what they were; certainly I have no recollection of buying any as a schoolboy. Most of my collection was made on the borders of Dorset and Devon, within a few miles of the sea.—JOHN H. STILL; Langstone, Horrabridge.

[Although it has a wide distribution throughout Europe, *Cænonympha arcania* is a local species, but in nearly all places where it occurs it is common. Mr. De Vismes Kane, in his 'European Butterflies,' says that it is abundant in most parts of France. A form of the species, known as *satyrion*, Esp., affects the more elevated meadows of Switzerland, whilst at lower altitudes *darwiniana*, Staud., another form, is found. This last is intermediate between var. *satyrion* and the type. Stephens, in 'Illustrations of British Entomology,' *Haustellata*, i. p. 69 (1828), includes this species, under the name of *Hipparchia arcanius*, on the slender evidence of a single specimen in Mr. Plastead's collection, which was supposed to have been captured in England. Wood and Curtis both figure this specimen, and the last-named author, in his 'British Entomology,' Lep. i. p. 205, says of it:—"captured by Mr. Plastead, it is understood, on the borders of Ashdown Forest."—ED.]

VARIATION OF CHRYSOLOPHUS SPECTABILIS.—During a lengthened stay in Victoria, in the present year, I had good opportunities for collecting and observing the habits of several species of Australian Coleoptera. Soon after commencing to collect, in January, I became impressed with the great

variation of several species, and prominent among them being *C. spectabilis*. In the Nilumbik Valley, eighteen miles north-east of Melbourne, the species is common, and inhabits the low vegetation; I obtained all my specimens on the dark green boughs of the young black wattles (*Acacia decurrens*). As evening approaches the beetles ascend the stems of the plants, and alternately move slowly and cautiously along the boughs, and resting motionless for some time, when in the latter position the slightest artificial movement of the bough caused the insect to drop suddenly into the long grass beneath. It is, however, more the variation of the species than its habits that I desire to record. I regret that I have not the original description in my possession, but the species is undoubtedly subject to great variation, my specimens ranging from a pale green ground to dark brown or black; some are richly and regularly dotted with gold on a green ground, while others are marked with irregular black patches or dull green and bluish grounds. I have one bright burnished specimen and one black, and other intermediate forms; the species also varies greatly in size in both sexes. When searching for the insects I observed that the dark forms were more difficult to detect on the boughs than the gold-dotted or pale green varieties. I may also mention that last spring and summer were the driest and hottest on record in Victoria, but how such affected insect-life as compared to previous seasons I cannot say. Mr. Cockerell's appeal to entomologists to "take careful notes of all varieties they meet with from time to time, and especially the conditions under which they exist," is certainly to the point, and all—beginners particularly—would do well to act on the suggestion. The chemistry of their food-plants in each season will probably have to be worked out, as having special bearing in all stages on the variation both of the larva and imago.—W. W. SMITH; East Belt, Ashburton, New Zealand, Nov. 25, 1889.

NOTES ON THE SEASON 1889.—On Good Friday I journeyed to Windermere to look for the larvæ of *Laverna lacteella*. Few collectors can see the difference between this species and *L. paludicolella*, Doubl. The food-plant, *Epilobium hirsutum*, was just peeping above ground, and I collected all I could find, hoping that either ova or larvæ might be thereon; but when I examined it at home I could only see two small larvæ; these were obscure whitish in colour, with black heads, and one of them produced a moth in June. In trying to force imagines a month or so earlier from the mines and cocoons I had gathered the previous autumn, I was not eminently successful, as from about 400 larvæ of *Nepticula gei* and *N. splendissimella* I only bred about a dozen specimens. As, in subsequently searching for them, I could find very few empty cocoons, I concluded that owing to the cold weather the larvæ had not vitality enough to undergo the change. A similar unsatisfactory result befel a canister-full of Nepticulidæ and *Lithocolletis caledoniella* from Renfrew. *Nepticula aucuparia*, *N. tityrella*, and *N. continuella* all did badly. The only species I bred in any number was *N. tiliæ* and about twenty-five specimens of *N. desperatella*. Last year I could not find any larvæ of *N. minusculella*, but six imagines were bred in 1889 from pupæ obtained in 1887. *Lithocolletis* fared badly; a very few *L. kleemannella* and *L. stettinensis*; while of *L. bistentella* I only got one specimen. Among the larger moths I may mention one fine *Cabera rotundaria*. During the season I visited Windermere on several occasions, but scarcely saw a *Geometra*, and *Tortrices* and *Tineæ* were very poorly

represented. I obtained one example of *Penthina capræana*, a species of which I had not taken a specimen since 1847, when I met with it at Swanscombe in Kent. *Nepticula intimella* were scarce, but on the wing much before the usual time. About the 20th of May I went on the moor above Stoneyhurst College and found moths abundant, and quite two weeks earlier than usual; *Hadena glauca*, *Acronycta menyanthidis*, *Nemophora pilella*, *Gelechia longicornis*, and a fair number of *Thecla rubi* were flying about; fortunately I had some 150 boxes with me, and these were quickly filled. About the second week in June I had a turn on the mosses, where I found some fine *Cænonympha typhon*; also *Hyria muricata* and *Acidalia fumata*, but scarcely anything else, although the mosses usually teem with insect life. I next had a turn on Arnside for *Lycæna astrarche* var. *salmacis*, but only got about half a dozen specimens. There was a high wind and a bright sun; they were no sooner in the net than out again. About this time I brought in my pots, in which I had put fourteen larvæ of *Cidaria reticulata*, with plenty of food. I did not expect to breed above three or four; however, eleven specimens came out, also a few *Penthina postremana* and *Coleophora fuscocuprella*. Early in July I went on the moors several times; no Macros, only a few large *Eupithecia satyrata*, first time in the district. I think they differ from my other specimens from various localities. *Penthina sauciana* and *Grapholitha geminana* were fairly common; the fine hot weather was favourable for the larva. In August I spent most of my time among Nepticulæ, and found them scarcer than usual, the commonest being *N. desperatella*. I found a good many extending over two months. On the way to Stoneyhurst *N. tilix* was not as common as last year, when I found eight in one leaf; *N. cryptella* and *N. serella* not many. Of the birch-feeders I found large numbers were killed in the mine by the hot sun. As far as I hear from my friends they one and all give a gloomy account of their season's work. I found *Nepticula* larvæ very sparing, even in October. I went for *N. minusculella* larvæ on the 1st of the month and only found four. On the 2nd I saw plenty of mines on the oak and nut in our Pleasure Gardens, and, strange to say, seeing a spotted leaf of the nut I turned it up, and there was a full-fed larva, with its rugged rough case, of *Coleophora fuscocuprella*. The usual places for me to get this species are nearly forty miles distant. I must note the capture of a fine *Ephestia semirufa* by my wife, in the kitchen, about the 16th of September.—J. B. HODGKINSON; Ashton-on-Ribble.

LEPIDOPTERA IN THANET.—It may interest some of the readers of the 'Entomologist' to learn a few of the more important captures that have been made within the last few years, by local collectors, in the neighbourhood of Ramsgate (Entom. xxi. 322). Leaving out those species which are of almost universal distribution, we have taken among the Rhopalocera:—*Vanessa c-album* (once, at Sevenscore), *V. polychloros*, *Melanargia galatea* (common), *Thecla quercus*, *Lycæna alsus*, *L. medon*, *Colias edusa*, *C. hyale* (once), *Vanessa antiopa* (was undoubtedly seen last September, but was not captured). Among the moths:—The three species of *Smerinthus*, *Sphinx ligustri* (common), *Acherontia atropos*, *Charocampa porcellus*, *C. celerio*, *Macroglossa stellatarum*, *Deilephila galii* (was taken in 1888), *Deiopeia pulchella* (has been twice taken), *Gastropacha quercifolia*, *Dicranura bifida*, *Acronycta aceris*, *Eremobia ochroleuca* (by day, on knapweed), *Calymnia diffinis*, *Cerigo matura* (cytherea), *Leucania comma*, *Bryophila perla*,

Aporophyla australis, *Apamea ophiogramma*, *Miana literosa*, *Agrotis suffusa*, *A. saucia*, *A. cursoria*, *Triphæna ianthina*, *T. fimbria* (once), *T. orbona*, *Xanthia silago*, *Hadena serena*, *Polia flavocincta*, *Calocampa vetusta*, *C. exoleta*, *Xylina semibrunnea*, *Epione apiciaria*, *Selenia lunaria*, *Eugonia alniaria* (once), *Cidaria miata*, *Aspilates citraria*, *A. gilvaria*, *Strenia clathrata*, *Fidonia atomaria*, *Melanippe procellata*, *Eubolia palumbaria*, *E. bipunctata*, *Mesotype virgata* (*lineolata*), and *Anaitis plagiata*. Although Thanet is destitute of woods, there are several snug little clumps of trees admirably adapted for sugaring. The ivied walls of Richboro' Castle are truly a magnificent sight, but can with difficulty be reached after dusk.—T. WILLSON; Dudley House, Ramsgate, March 6, 1890.

LIST OF INSECTS OBSERVED ON LUNDY ISLAND, JULY 13TH, 1888.—Lepidoptera-Rhopalocera:—*Pieris brassicae*, *P. rapae*, *Satyrus ianira*, *Cænonympha pamphilus*, *Polyommatus alexis*, *Vanessa cardui*. Lepidoptera-Heterocera:—*Camptogramma bilineata* (smaller than on the mainland), *Melanippe fluctuata*. Coleoptera:—*Ocypus olens*, *Telephorus melanurus*, *Calathus cisteloides*. Hymenoptera:—*Apis mellifica*, *Bombus muscorum*, *Chrysis ignita*, *Halictus albipes*, *Sphecodes gibbus*, *Formica nigra*, *F. rubra*. Diptera:—*Chrysotoxum fasciolatum*, *Scatophaga stercoraria*, *Musca casar*, *Calliphora vomitoria*, *Tipula oleracea*, *Anthomyia lucorum*. Hemiptera:—*Ptyelus*. Orthoptera:—*Perotettix pedestris*, *Forficularia auricularia*. Arachnida:—*Epeira diadema*.—(Rev.) F. A. WALKER; Dun Mallard, Cricklewood, March 11, 1890.

ADDITIONS TO THE NEWBURY LIST OF MACRO-LEPIDOPTERA.—Although the entomological season of 1889 proved to be most unsatisfactory, I was successful in adding several new species of Macro-Lepidoptera to our Newbury list. They are as follows:—*Eurymene dolobraria*, *Pericallia syringaria*, *Eugonia erosaria*, *Acidalia holosericata*, *Bapta temerata*, *Emmelesia adaequata*, *Eupithecia pulchellata*, *E. plumbeolata*, *E. irriguata*, *Lobophora secalisata*, *Eubolia cervinaria*, *Chesias spartiata*, *Nola cucullatella*, *Trichiura cratagi*, *Saturnia pavonia* (pupæ), *Acronycta leporina*, *Hydræcia petasitis*, *Noctua dahlî*, *Panolis piniperda*, *Taniocampa miniosa* (larvæ), *Tethea retusa*, *Dianthæcia capsicola*, *Asteroscopus sphinx*, *Heliaca tenebrata*.—M. KIMBER; Cope Hall, near Newbury.

PARASITES ON MOTHS.—The acarid moth-parasites, referred to by your correspondents, also occur in America. On August 25th, 1887, I took a Noctuid by the Blue River, Dillon, Colorado, with a red mite on its abdomen. Unfortunately, I did not ascertain what species the mite belonged to.—T. D. A. COCKERELL; February 25th, 1890.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—March 5th, 1890.—Capt. Henry J. Elwes, F.L.S., Vice-President, in the chair. Mr. G. H. Kerrick, of Edgbaston, Birmingham, and the Rt. Hon. Lord Rendlesham, of Rendlesham Hall, Woodbridge, Suffolk, were elected Fellows; and Mr. J. P. Mutch was admitted into the Society. Mr. C. G. Barrett exhibited a number of specimens of *Dianthæcia carphophaga*, Bork., bred by

Mr. W. F. H. Blandford from larvæ collected near Tenby, Pembrokeshire, on flowers of *Silene maritima*. He remarked that the series included a number of forms intermediate between *D. carpophaga* and *D. capsophila*, and established the fact that the latter is only a local variety of the former. Mr. W. H. B. Fletcher, Mr. Blandford, Mr. M'Lachlan, and the chairman took part in a discussion as to the identity of the supposed species. Mr. Barrett further exhibited a specimen of *Dianthæcia luteago*, var. *barrettii*, Db., also bred by Mr. Blandford from a larva found at Tenby, and he remarked that the species had not previously been taken in England; also a long series of forms intermediate between *Catoptria scopioliana*, Hw., and its small variety *parvulana*, Wilk., collected by Mr. E. Banks, Mr. Fletcher, Mr. Vine, and others, in Sussex, the Isle of Wight, and Pembrokeshire; also a specimen of *Botys mutualis*, Zell.,—a species widely distributed in Asia and Africa,—taken by Mr. C. S. Gregson near Bolton, Lancashire. Mr. A. F. Griffith exhibited and made remarks on the following:—two specimens of *Myelois pryrella*, taken in the London Docks in 1888, and, for comparison, a series of *M. ceratonix*; two specimens of *Penthina grevillana* and a series of *P. pralongana*, taken in Sutherlandshire, and, for comparison, a series of *P. sauciana*, var. *staintonian*; three specimens of the form of *Exapate* named *duratella*, with two of the ordinary *E. gelatella*, bred from larvæ taken in Sutherlandshire on *Myrica gale*; one specimen of *Incurvaria tenuicornis* and four of *Nemophora pilella*; three specimens of *Ornix fagivora* from Cambridge; also two specimens from Sutherland and five from Abbot's Wood, Sussex, of a form apparently allied to *Tinea rusticella*, with specimens of the latter from Sutherlandshire and Brighton for comparison; also two specimens of a unicolorous variety of *Hypermeia angustana*, from Horning, Norfolk. Mr. H. Goss exhibited several abnormal specimens of *Chelonia caia*, bred last December. The object of the exhibition was to show the effect produced by forcing the larvæ, and subjecting them to unusual conditions. It was stated that the peculiarity of the colour of the hind wings of the female parent had not been transmitted to any of the offspring. Mr. Blandford referred to two specimens of a species of *Cardiophorus*, from Tenby, which he had exhibited at the August meeting of the Society as *Cardiophorus cinereus*, and stated that subsequent investigation had led him to hand them to Mr. Champion for determination. Mr. Champion was of opinion that they did not belong to the same species; that one of them was *C. asellus*, Er., and the other, probably, *C. equiseti*, Hbst., a species new to this country. Mr. C. J. Gahan read a paper entitled "New Longicornia from Africa and Madagascar." Capt. Elwes read a paper entitled "On a new species of *Thymara* and other species allied to *Himantopterus fuscinervis*, Wesmæ." Mr. M'Lachlan made some remarks on the subject in connection with an examination and drawing of the type of *Himantopterus* made some years since. Dr. Sharp read a paper entitled "On some Water Beetles from Ceylon." Mr. J. J. Walker, R.N., communicated a paper entitled "Notes on Lepidoptera from the Region of the Straits of Gibraltar." Mr. F. Merrifield, Mr. B. G. Nevins, Capt. Elwes, and Mr. G. Lewis took part in the discussion which ensued. It was announced that papers had also been received from Mr. E. Meyrick, Prof. Westwood, and Mynheer P. C. T. Snellen; but in consequence of the lateness of the hour the reading of them was postponed to the next meeting.—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
 —January 23rd, 1890.—T. R. Billups, F.E.S., President, in the chair. Messrs. G. A. Lewcock, of Islington; W. Gardner, of Liverpool; and P. Bright, of Bournemouth, were elected members. The Treasurer having submitted his balance-sheet, showing a good balance to the Society's credit, the Secretary read the Council's report for 1889, from which it appeared that 44 members had been elected during the year, making a total membership of 223, consisting of 6 honorary, 3 life, 47 country, and 167 full members. The election of officers was next proceeded with, and resulted as follows:—Mr. J. T. Carrington, F.L.S., President; Mr. W. H. Tugwell and Mr. J. Jenner Weir, F.L.S., &c., Vice-Presidents; Mr. E. Step, Hon. Treasurer; Mr. W. West, Hon. Curator; Mr. D. J. Rice, Hon. Librarian; Mr. Barker and Mr. D. F. Rice, Hon. Secretaries; Messrs. R. Adkin, F.E.S.; T. R. Billups, F.E.S.; T. W. Hall, F.E.S.; J. R. Wellman; R. South, F.E.S.; C. A. Briggs, F.E.S.; and C. G. Barrett, F.E.S., Council. The retiring President then read his address, and the meeting closed with votes of thanks to the various officers.

February 13th.—J. T. Carrington, President, in the chair. Mr. Barrett exhibited a long series of *Phycis adornatella*, Tr., from various localities, and remarked that some fifteen or twenty years ago a form of this species was obtained from the west of England, which differed from the specimens obtained at Box Hill, Surrey; the chief distinguishing characteristic being that the western specimens had a white fascia; this form was considered by Prof. Zeller as a distinct species, and it received the name of *subornatella*; in the course of time specimens were obtained from other localities, which were intermediate between the two forms, and it had now been decided that *subornatella* was only a variety of *adornatella*. Messrs. South, Adkin and Tutt made some remarks relative to this exhibit. Mr. Barrett, on behalf of Mr. Vivian, exhibited *Homæosoma sinuella*, and a variety of *Hesperia lineola*, taken in Cambridgeshire. Mr. Moore, a collection of Lepidoptera, Coleoptera, &c., from the coast of Labrador; and Mr. Weir pointed out that among them was a specimen of *Polyommatus phlaeas*, which was not a species one would expect to occur at Labrador. Mr. Tutt exhibited photographs of varieties of *Abraxas grossulariata*, *Arctia caia*, *A. villica*, *Spilosoma lubricipeda*, *S. mendica*, &c. Mr. Lewcock, larvæ and perfect insect of *Mesium affine*, Boisd. Mr. Carrington, in his remarks on taking the chair, made some interesting suggestions for the Society's work during the coming season.

February 27th.—The President in the chair. Messrs. W. Smith, of Paisley; W. Bloomfield, of Mildmay Park; and G. A. Farini, of Forest Hill; were elected members. Mr. Bloomfield exhibited two specimens of *Hesperia lineola*, taken in Essex, 1888. Mr. Watson, a nest of a species of *Mantis* with two living examples of the insect; many other specimens had emerged in transit from Sydney, where the species was said to occur freely. Mr. Billups, *Meopus trispinosus*, Wat., from New Zealand; *Poroppleura monstrosa*, Oliv., from Brazil; and read notes relative to his exhibit. Mr. Billups also showed galls collected at West Cliff, Colorado, by Mr. Cockerell, who wrote that the rose-galls were of three species: *Rhodites ignata*, Osten-Sacken, from which an abundance of a parasitic Cynipid, *Periclistus pirata*, Osten-Sacken, would be bred; *Rhodites fusiformis*, a new species, and the little blister-like galls on the leaves would produce *Rhodites rosafolia*, Cockerell. Of the willow-galls, the reddish fusiform ones pro-

duced *Cecidomyia salicis-silique*, Walsh., the bud-galls *Cecidomyia salicis-strobiloides*, Osten-Sacken. Mr. Cockerell expressed an opinion that from the galls many Chalcids, including some rare species, would be reared, in addition to the gall-makers. An exhibition of microscopical objects was then given by Messrs. Collins, W. West, R. Adkin, T. R. Billups, Cameron and others.

March 13th.—The President in the chair. Messrs. A. E. Peake, of Tooting; and E. W. Sinclair-Cox, were elected members. Mr. Tutt exhibited typical specimens of *Agrotis obelisca*, Hb., from Germany; the variety *hastifera*, Donz., from Hungary; and some picked specimens captured by Mr. A. J. Hodges in the Isle of Wight, of a different type to the var. *hastifera*, but much nearer that than the typical *obelisca*. Mr. R. Adkin, referring to a series of *Mania typica* which he exhibited, said that the larvæ were found last autumn, and were fed up in a warm room. The majority pupated in November, and the imagines emerged in January and February of the present year. He had found a similar method of forcing the larvæ of some species of *Triphana* equally successful, and he believed that many other Noctuæ whose larvæ hibernated might be similarly treated with good results, provided of course that the larvæ could be induced to take such food as might be obtained during the winter months. Mr. Gerrard exhibited living larvæ and pupæ, with set examples of the imago, of a species of *Ephestia* discovered in some old samples of rice. At present he was unable to say where the moth came from, as the samples of rice were from Japan, Java and Burmah, and these had unfortunately been mixed; he would, however, write to the merchant who had forwarded the samples, and get further information. Mr. Mansbridge exhibited living larvæ and imagines of a *Tineæ* found feeding in samples of fish-guano, and said that the guano was brought from Brettesnaes, on the N.W. coast of Norway, and was composed of the flesh and bones of small cod and herrings. The larvæ inhabited a tube or gallery which was formed of particles of the food united with silk. In all the examples seen, these galleries were beneath the surface, but before pupating the larva worked its way upwards and pupated just below the surface. Mr. West (Greenwich) exhibited a fine collection of Coleoptera from the Columbian Republic. Mr. Billups, a specimen of *Ichneumon haglundi*, Holmg., a species new to Britain, bred by Mr. R. Adkin, from a larva of *Arctia fuliginosa*, received from Scotland; a series of *Apanteles emarginatus*, Nees., bred from *Gracillaria omisella*, by Mr. Elisha; a specimen of an Hemipteron of the genus *Pentatonia*, taken alive in the Borough Market, from a package of West Indian bananas; a species of Chrysomelidæ, found alive in a barrel of grapes from Malaga; and a live female specimen of *Bombus latreillus*, Kirby, found among lettuce from the South of France.—H. W. BARKER, *Hon. Sec.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—February 20th, 1890.—J. A. Clark, F.E.S., President, in the chair. Mr. C. B. Smith was elected a member of the Society. Mr. Whittle exhibited three specimens of *S. fagi* from Epping. Mr. J. W. Tutt, the genus *Xanthia*, including a long series of intermediate forms of *X. fulvago*, from perfectly clear to very dark specimens; also a selection of *Agrotis tritici* from Deal, Aberdeen and Valais, exhibiting variation in ground colour from pale whitish-grey to deep-brown and black, and the two marked forms, (a) with pale costa and median nervure, (b) without pale costa. In the

course of his observations Mr. Tutt said, that the latter reticulated form had often been mistaken for *A. cursoria*, and that Newman, in his 'British Moths,' undoubtedly treats it as such, although at the same time he figures the true *cursoria*. The exhibits of Coleoptera were:—Mr. Milton, *Blaps similis*, Latr.; *Necrophorus interruptus*. Mr. Heasler, *Geodephaga*. Mr. Mr. Raine, preserved larvæ of *Tenebrio* and *Ocypus*. Mr. Cripps, *Apionidæ*, &c. Mr. A. U. Battley gave an interesting account of the construction of spiders' webs. He differed from those who affirmed that the framework was built first, and demonstrated this by means of a number of models and diagrams taken from webs in actual progress, as witnessed by him during last year. It appeared, from his observations, that the radii were first constructed.

March 6th. — The President in the chair. Mr. Whittle exhibited a series of *M. plagiodyctylus*, and a specimen of *B. piniaria* captured in the city; also *D. oo* and *A. nemoralis*. Mr. Battley, dark vars of *H. marginaria*. Mr. Quail, life-histories of *C. ligniperda* and *Z. pyrina*. Mr. Simes, a pair of *E. autumnaria*, taken at Southsea in September last. Mr. J. A. Clark, both sexes of *Blatta americana*, the female with egg-bag attached. Mr. Milton, *T. apiformis* and *N. orion*; also Coleoptera. Mr. E. A. Newbery exhibited two examples of *Amara nitidus*, which he had found in an old collection mixed up with *A. communis*. Mr. Heasler, *Bembidium 4-guttatum*, *Chlenius vestitus*, and *Stenus bipunctatus*. Mr. G. A. Lewcock, a necklace composed of pupa-cases of a species of *Coccus* found in an ant's nest at Cape Colony, received from Mr. P. W. Jarvis. Dr. J. S. Sequeira, a pair of migratory locusts (*Pachytylus migratorius*) picked up on board a vessel in the Mediterranean. — G. A. LEWCOCK, E. HANES, *Hon. Secs.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY. — February 17th, 1890. Mr. W. E. Blatch, President, in the chair. Mr. C. J. Wainwright read a paper on "One day's work in Wyre Forest," in which he described an unusually good day's collecting. Many species were taken, including larvæ of *Endromis versicolor*, many of *Asphalia flavicornis*, and many other good species. He urged on the members to devote special energies to the Forest, which he believed to be the best district, at any rate in the Midlands. Considerable discussion followed, in which Messrs. G. T. Baker, W. E. Blatch and R. C. Bradley joined.

March 3rd.—Mr. W. E. Blatch in the chair. Messrs. H. M. Lee, A. Johnson and R. P. Gilbert were elected members. Mr. A. H. Martineau showed a large exotic *Bombyx*, bred from an evidently imported larva sent from Yorkshire. Mr. W. E. Blatch, showed *Phiba apteryx lapidata* taken at Shap Fell in September last. This he believed to be the first recorded capture in England. Rev. C. F. Thornehill remarked that there appeared to be two forms of *Phigalia pendaria* found near Burton:—one early, large, and well-marked, found in the open country; and one three weeks later, small and not so well-marked, found in the woods. He wished other members to record their experience. Mr. Thornehill then read a paper on the Lepidoptera of Burton-on-Trent, in which he mentioned the most interesting species taken in or near the town. Butterflies were decreasing in number of species. Sphinges were very well represented; Bombyces fairly well, as also the Geometers; but the Noctuæ were not so well.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

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EDITORIAL.

OUR readers will be glad to learn that the Reference Committee of 'The Entomologist' has been augmented by the addition thereto of the eminent entomologist, Mr. HENRY WALTER BATES, F.R.S., F.L.S., F.E.S., &c.

VARIATION OF *AGROTIS TRITICI* AND *A. CURSORIA* FROM LANCASHIRE.

BY RICHARD SOUTH.



Fig. 1.—*Agrotis tritici*, upper and under surfaces.

Fig. 2.—*A. cursoria*, upper and under surfaces.

I AM indebted to Mr. Baxter, of St. Anne's-on-the-Sea, Lancashire, for series of *Agrotis tritici* and *A. cursoria*, showing the range of variation of these species in his district.

The thirty-four examples of *tritici* and forty-five *cursoria* selected have been arranged, according to markings, into thirteen groups. An attempt was made to form colour detachments, but this was abandoned, as it did not promise to lead to any useful result. The colour variation of *tritici* from this district does not appear to be very extensive: a few specimens are grey-brown, others pale reddish brown, and one or two fuliginous brown; but the majority of examples would be best described as dark brown.

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Cursoria is more variable in colour, and the aberration exhibited may be tabulated as follows:—

- Grey. — *a.* Whitish grey—leaden grey.
 b. Ochreous grey—brownish grey.
Brown.—*c.* Pale whitish brown—ochreous brown.
 d. Pale reddish brown—dark reddish brown.

Except as regards certain specific characters, to be referred to presently, many forms of *tritici* are almost identical in marking with forms of *cursoria*. In the majority of these parallel instances there is a colour difference, but it is not always so; and although it is quite possible that anyone may readily separate typical *cursoria* from *tritici* by colour alone, it may not always be quite such a facile undertaking to distinguish correctly between certain forms of the two species, unless well acquainted with the specific characters of each species.

The pale transverse lines on the fore wings of *tritici* and *cursoria* are usually bordered by dark lines; but although these are, on the disk of the wing, subject to considerable modification in the direction of complete effacement, they are almost invariably indicated on the costa as spots and dots. For the purpose of comparison, however, it is not necessary for us to concern ourselves with the discal markings, as only those on the costa are of any real use.

Referring to the woodcut above, it will be observed that *tritici* (fig. 1) has a dark bar on the costa between the basal and inner lines of fore wing, whilst in *cursoria* (fig. 2) these lines are each preceded and followed by dark dots, the space between the lines being clear. The under surface of the fore wing also affords good specific characters. *Cursoria* (2) is more or less fuliginous from base to central transverse line, and pale beyond to outer margin; the discal spot is black, and very distinct. *Tritici* is suffused with fuscous on the outer half of wing, and the inner becomes pale towards base; there is a black discal spot, and from the outer edge of this a broad pale ray is projected towards external margin of the wing. These are trustworthy characters, and in ninety-nine cases out of a hundred *tritici* may be distinguished from *cursoria* by reference to the upper surface alone; but if there should be any doubt about the matter, examination of the under surface will solve the difficulty.

As regards ornamentation, the aberration of *tritici* and *cursoria*, from St. Anne's, represents the entire variation of these species, so far as I am acquainted with it. Specimens in my collection, from other localities, are more striking perhaps, but they are only extreme examples of one or other of the varietal groups into which I have divided the Lancashire specimens. As it may present the matter in an intelligible form, I have attempted

to tabulate the variation of transverse and longitudinal markings, as under:—

A.—Transverse lines distinct.

Section I.—Subcostal longitudinal streak more or less well defined.

Group 1.	Streak white.	5	<i>tritici</i> .	1	<i>cursoria</i> .*
„ 2.	„ grey.	3	„	3	„
„ 3.	„ ochreous.	1	„	1	„

Section II.—Subcostal longitudinal streak ill defined.

Group 4.	Streak suffused.	4	<i>tritici</i> .	4	<i>cursoria</i> .
„ 5.	„ represented by a basal dash only.	6	„	4	„

Section III.—Subcostal longitudinal streak absent.

Group 6.	An angulated band-like transverse shade passing between the stigmata.....	3	<i>tritici</i> .	5	<i>cursoria</i> .†
„ 7.	Without band-like shade.	2	„	2	„

B.—Transverse lines evanescent.

Section I.—Subcostal longitudinal streak fairly well defined.

Group 8.	Streak white.	1	<i>tritici</i> .	1	<i>cursoria</i> .
„ 9.	„ ochreous grey.....			2	„

Section II.—Subcostal longitudinal streak ill defined.

Group 10.	Streak suffused.	3	<i>tritici</i> .	4	<i>cursoria</i> .
„ 11.	„ represented by a pale basal dash.	3	„		

Section III.—Subcostal longitudinal streak absent.

Group 12.	Traces of a transverse band-like shade.	1	<i>tritici</i> .	1	<i>cursoria</i> .
„ 13.	No trace of transverse shade.	2	„	2	„

Besides the aberrations adverted to in the foregoing tables, there are several others which it is not possible to group or tabulate in a satisfactory manner; but some reference must be made to variation of the stigmata. In both species the reniform and orbicular stigmata are usually outlined in white, whitish, or pale brown, and filled up with the ground colour. All the examples of *tritici* have the lower fourth of reniform dark, but seldom so black and conspicuous as it is in the majority of the specimens of *cursoria*. The space between the stigmata is generally darker in *tritici* than *cursoria*.

In the last-named species there appears to be greater diversity in the colour of stigmata: two specimens have both reniform and orbicular entirely white; two have these stigmata narrowly outlined in white, and filled up with black; whilst two others, with fairly distinct transverse discal lines, have but the faintest possible trace of any stigmata whatever. Several specimens have the orbicular more or less completely eliminated, and the reni-

* The specimens figured belong to group 1.

† Two specimens of *cursoria* in group 5 have the transverse shade more or less clearly defined.

form represented by the blackish lower fourth only. These last modifications of the stigmata are only observed in the pale coloured specimens, and are generally associated with absence of longitudinal and transverse markings.

The claviform, sometimes not present in either species, is usually outlined in black in *tritici*, and black or brown in *cursoria*. In some specimens of each species it is large and well defined, while in a few it is entirely filled up with black, and only separated from a longitudinal black basal bar by the inner transverse line.

The pale colour on costal area has been referred to in these notes as the subcostal streak, because it appears to be the amplification of a character which exhibits initial development on the subcostal nervure. In some examples of *cursoria* from Unst, the space between subcostal nervure and the costa itself is filled up with white, and in these specimens the specific characters of upper surface are of course hidden.

THE USE AND ABUSE OF THE TRINOMIAL SYSTEM.

By RICHARD SOUTH.

To any who may be inclined to confer varietal names, the numerous forms of *Agrotis tritici* and *A. cursoria* will afford abundant material upon which they can operate with consummate satisfaction to themselves; but as I have yet to learn in what way science in general, and that of Entomology in particular, is advanced by the imposition of distinctive names on certain links in the chain of an insect's variation, I have not ventured to take upon myself the responsibility of adding some fifteen or twenty names to the perplexing list of aberrations we already have.

I am well disposed towards the trinomial system, as suggested by Mr. Cockerell (Entom. xx. 150), but the most ardent supporter of that system must take exception to the wholesale christening of more or less unimportant aberrations. The lepidopterist is well aware that with very many species, especially among the Noctuæ and Geometræ, there is a tendency to deviate either in colour or markings, sometimes both, from a given type. In some of these species aberration is often of a most extensive character. The scheme of variation, however, is, with few exceptions, identical throughout, i. e., there is aberration (a) in colour, (b) modification of markings. As regards colour, departure from a fixed type is exhibited in one of two opposite directions, sometimes both: one graduates in the direction of melanism, the other towards albinism; whilst the ornamentation may be well developed, and consequently conspicuous on the one hand, or evanescent on the other. In a good series which really

represents the range of a species variation, it is rare to find a form that cannot be linked up with the type by intermediate aberrations. Any such exceptions are, perhaps, most likely to occur among the representatives of a species from isolated localities. When dealing, therefore, with the forms of a variable species, it would surely be supererogatory to name all those individuals which deviated more or less from the typical form of that species; but less than this we cannot do, if we essay anything in the way of varietal nomenclature, and desire at the same time to be consistent. Haworth and Stephens, among others of the older entomologists, described and named several forms of *A. tritici* as distinct species, but these have long ago been deposed. It would be interesting if twenty lepidopterists of the present day would select specimens which they considered to agree with the descriptions of—say, for example—*lineolata*, Haw., *albilineata*, Haw., *cuneigera*, Steph., and *ocellina*, Steph., and submit these to some competent authority for adjudication. Such an experiment would be valuable, as it would illustrate individual appreciation of varietal differences, and possibly furnish a startling exposition of the general inutility, from a practical point of view, of endeavouring to permanently fix that which is unstable.

Charæa graminis has been divided up into twelve named forms, and at the same time we are told that there are numbers of intermediate forms. It would seem, then, that anyone desiring to work out the varieties of this species correctly, *i. e.*, according to the oracle, must be a clairvoyant, or he will probably go astray.

The absurdity of variety naming of the hair-splitting order attains its maximum when the nomenclator takes a coloured figure for his type, and dubs as var. *intermedia* a specimen which is not so highly tinted with a particular colour as such figure.

Suppose we have four specimens of a species, which in the matters of colour and markings are fairly constant within certain limits:—A, agrees with the description of the type of the species in every respect. B, however, differs from A, and of course from the type, in having a paler tint, but the markings are identical in both specimens; we therefore name this var. *pallida*. C, has the colour of the type, but the markings are not well defined; so we will call this var. *obsoleta*. D, is rather darker in colour than the type, but the markings are similar to those of C; as this specimen does not agree exactly with either B or C, and as it is still further removed from the type, we must name it also, say, var. *obscura*. So far, well; but someone has a fifth specimen, which in tint is the same as B, but the markings are less clearly defined than in C. This example cannot be referred to *obsoleta*, because that var. has typical coloration; and, although it agrees in tint with var. *pallida*, the markings won't do, as they are far from typical.

So, to make things pleasant all round, this individual would have to be furnished with a name also.

In his 'Code of Varietal Nomenclature,' Mr. Cockerell (*l. c.*) proposes terms expressive of certain kinds of variation common to many species of Lepidoptera, and the adaptation of one or other of these suitable to the occasion would, in the majority of cases, convey as clear an idea of the form referred to as an extended description could do. There is, too, this distinct advantage, that whereas the one refers to a phase of variation, the other singles out a particular individual, and elevates it to the dignity of a type, a distinction which in some cases it certainly does not deserve.* It should be remembered that these third names are really epitomised descriptions; therefore if we wish to inform a friend, or the entomological public at large, that we have taken some specimens of *A. cursoria* in which all the markings are absent, we can do so shortly, by writing *A. cursoria deleta*. In the case of specimens received from foreign localities, with the fauna of which we are not quite familiar, it is not only permissible, but highly desirable, as a check to synonymy, that names should be given to specimens showing any well-defined aberration. These examples might certainly prove, on further examination, to be distinct species; but then no harm would be done, as all that would be necessary would be to state the fact, and their names would go with them in their promotion. At all times, well defined local forms or races of a known species should be named; and, when it can be done, it would be well if such names were framed, with reference to habitat, or, perhaps, better still, to some striking feature exhibited by the form.

CRITICAL NOTES ON DIPTERA.

By G. H. VERRALL, F.E.S.

As to the five species introduced as new to Britain by Mr. Brunetti (Entom. 122), *Psilocephala ardea*, F., is quite properly noticed; the species introduced by B. Cooke as *Thereva fuscipennis*, Mg., in Ent. Mo. Mag. xv. 19 was really *Psilocephala ardea*, F., as I have since ascertained from some of the original specimens in Dr. P. B. Mason's collection. Consequently *Thereva fuscipennis*, Mg., should be erased from my list and *Psilocephala ardea*, F., substituted. *Lasiops semicinerea*, W., has nothing to do with the genus *Lasiops*, and is in my list as a *Hyetodesia*; it is very common in the North, while I have taken it as far South as Sussex and Devonshire. I have seventeen localities for it. *Leria ruficauda*, Zett., is probably correct; I

* Possibly this is so with *Heliophobus hispidus* var. *obsoletus* (Entom. xxii. 187).

have a number of specimens taken at Plashett Wood, Sussex, on April 5th, 1870, so labelled, but I have never critically examined the *Helomyzidæ*. *Heteromyza atricornis*, Mg., does occur in my list, but in a place where nobody would expect it; the species introduced as *Pegomyia rotundicornis*, Zett., is really *Heteromyza atricornis*; I caught the species in abundance near Lairg on June 20th, 1884, but it occurs South, as I had just previously taken it in Sussex, and I think I have it from Devonshire, while Dale's specimens of *Pegomyia rotundicornis* were from Dorsetshire. I was not sufficiently satisfied with its name to include it in my list. *Sapromyza platycephala*, Lw.; as far as I know this species exists only upon two injured specimens described in 1847 from Mehadia in Hungary, upon the borders of Roumania: I should hardly expect this to be common on the windows of a London house in 1889, without having been observed in the intervening 42 years. I have been too busy with my own captures this winter to afford time to name many specimens belonging to other people, or else I expect I should have been able to examine some of the specimens; but even if I had, my critical knowledge of *Sapromyza* is insufficient to enable me to speak with confidence.

Dicranomyia dumetorum, Mg. The common species, London and everywhere else, is *D. chorea*, Mg.

Lonchoptera trilineata, Zett. I have several specimens which I believe to be this species, but having never critically examined the genus, I refrained from adding species; the distinctive characters of the various so-called species are as yet very unsatisfactory.

Ascia dispar, Mg. This may be a good species, but I cannot yet satisfactorily distinguish it from *A. floralis*, Mg.

Microdon devius, L. I have not seen recent specimens of this, but should very much like to do so, as I have seen a beautiful specimen of the other species, *M. mutabilis*, L., caught last year in Devonshire by Major Yerbury.

Conops vitellina, Lw. According to a recent comparison made by Mik between this species and *C. 4-fasciata*, DeG., all our specimens are yellow specimens of the latter; types that I possess point to the same result. *Conops* is feminine, and in this genus, as well as in *Chrysops*, the specific names may well be made feminine.

Theria muscaria, Mg., was brought forward as British in July, 1888, by Dr. R. H. Meade in time for me to include it in my list (*Ent. Mo. Mag.* xxv. 27); further details were given by Mr. Coryndon Matthews in *Ent. Mo. Mag.* xxv. 379.

Cynomyia mortuorum, L., was common at Rannoch in June, 1870.

Tephritis matricariæ, Lw. I think it would be better in a

case like this to mention a *Tephritis* sp?, rather than repute a new species to Britain.

Palloptera parallela. Mr. Brunetti gives no author's name to this species, and I cannot trace that it has ever been described; in fact, the name is quite a new one to me.

As to the three species of *Limosina* said to be not mentioned in my list, I may say that *L. pusilla*, Mg. = *L. acutangula*, Zett.; *L. fenestralis*, Fln., is in the list of reputed species; while *L. cilifera*, Rond., is an unsatisfactory Italian species, at present unconfirmed by any subsequent writer.

Now that I am writing I may enumerate a few unrecorded British Diptera, and corrections to my list:—

Cecidomyia alpina, F. Lw. *C. filicina*, Kief (= *C. pteridis*, Müll.). *C. foliorum*, Lw. *C. tubicola*, Kief.

Diplosis betulina, Kief. *D. frazinella*, Meade.

Schizomyia (Kief) *galiorum*, Kief.

Sciara flavipes, Pz.; confirmed.

Cordyla crassicornis, Mg. To be omitted and added to List of Reputed Species: the ? *crassicornis*, Curt., seems to belong to a new genus near *Anatella*, according to a specimen in Mr. C. W. Dale's collection.

Leia elegans, Winn.; in Mr. C. W. Dale's collection.

Diadocidia ferruginosa, Mg.; confirmed.

Chironomus flexilis, L.; confirmed: near Rydal. *C. nigri-manus*, Stæg.; confirmed. *C. nubeculosus*, Mg.; confirmed. *C. fuscipennis*, Mg.; confirmed. *C. biannulatus*, Stæg.

Tanytus guttipennis, V. d. Wulp; in The Broads. *T. phatta*, Egg.; in myriads at Slapton Lea.

Ceratopogon bipunctatus, L.; confirmed. *C. varius*, Winn.; confirmed: common in my house. *C. femoratus*, F.; confirmed.

We must be very rich in Chironomidae in England; I possess (after excluding, as far as known, all above 12 specimens of a species) over 2500 specimens, comprising, I believe, at least 270 species, but the ascertaining the correct names is very difficult; for instance, Stæger described, in 1840, a *Chironomus nigri-manus* from Denmark, which he said was very rare in May and June; in 1850 Zetterstedt had never seen this species, but in 1859 he obtained one female, and says Rotts had caught both sexes in the spring at Ringsjon; Van der Wulp described, in 1859, two males caught at The Hague, which he says tolerably, but not thoroughly, agree with Stæger's description; in 1877 he notes that Wttewaall had caught it at Utrecht. These are all the references to the species with which I am acquainted, except Walker's description in Ins. Brit. Dipt. iii. 172, which, according to the table on p. 153, must refer to a very different species. Now, I have had under my eyes forty or fifty males of one species, probably that

taken by Van der Wulp, and I possess six males of a closely-allied species, seven males of another which would pass under Stæger's description, one male of a fourth species, and two large males of a fifth species with dark tibiæ, besides females of several species. Who can say which of my five species is *Chironomus nigrimanus*, Stæg., and what species were represented in the stragglers previously recorded?

Limnobia stigma, Mg.; common in North Wales.

Dicranomyia ornata, Mg.; in Rev. T. A. Marshall's collection.

Atherix unicolor, Curt. = *Ptiolina wodzickii*, Frfld. I will not at present discuss the priority of name.

Rhamphomyia dispar, Curt. = *Ocydromia glabricula*, Fln.!

Edalea stigmatica is a misprint for *stigmatella*.

Clinocera barbatula. Instead of "Hal." put "Mik."

Tachydromia stramineipes, Zett., is only a variety of *T. pectoralis*, Fln. I caught a long series last August in Tilgate Forest showing every gradation.

Psilopus obscurus, Mg., is probably a synonym of *P. longulus*, Fln.

Neurigona pallida, Fln.; confirmed. *N. suturalis*, Fln.; confirmed. *N. Erichsonii*, Zett.; relegated to "Reputed Species."

Gymnopternus parvilamellatus, Mcq., is a *Hercostomus*.

Chrysotus angulicornis, Kow.

Argyra atriceps, Lw.

Sympycnus nigrifemoralis, Zett. = *S. æneicoxa*, Mg. *S. bifasciellus*, Zett. = *Lamprochromus elegans*, Mg.

Platypeza modesta, Zett., and *P. rufa*, Mg. Quite correctly introduced in Mr. C. W. Dale's 'History of Glanvilles Wootton.'

Chalarus holosericeus, Mg., is only the other sex of *C. spurius*, Fln.

Pipizella biguttata, Curt. = *P. flavitarsis*, Mg.

Chilosia mutabilis, Fln.; confirmed.

Rhingia campestris, Mg. I am now convinced that there are more than one species of *Rhingia* in Europe, and that our common species is *R. campestris*, Mg. I am not yet satisfied that *R. rostrata*, L., also occurs here, although I expect it does.

ANTHOMYIDÆ. The four subfamilies I have indicated are distinguished as follows:—

MYDÆINÆ: Dorso-central bristles 2 in front of suture, 3, or more commonly 4, behind suture; anal and axillary veins both straight and abbreviated; eyes often hairy. Usually large, stoutly-built species, with plumose arista and frequently spotted abdomen.

ANTHOMYINÆ: Dorso-central bristles 2 in front of suture, 3 behind; anal vein extended (though faintly) to margin; eyes very seldom hairy; abdomen never with the characteristic "*Limnophora*" spots, and never stout and rounded, but more elongate.

HOMALOMYINÆ: Dorso-central bristles 2 in front of suture, 3 behind; anal vein short, axillary curved and continued beyond end of anal; arista nearly always almost bare; eyes bare. Small or rather small species; abdomen shortish, broad, flat, and with characteristic triangular dorsal spots or modifications thereof.

CENOSINÆ: Dorso-central bristles 1 in front of suture, 3 behind; anal and axillary veins straight and abbreviated; eyes of male never nearly touching, always bare; abdomen tubular, usually spotted.

In January, 1888, Mik called my attention to a distinction in the claws of Mydæinæ and Homalomyinæ.

Poliates hirticrura, Meade; confirmed: Kilmarnock.

I need not repeat Meade's additions, unless by way of criticism, as he has been kind enough to send me nearly all for examination.

Limnophora albifrons, Rond.; the specimen was *Hydrophoria socia*, Fln., ♀.

Hydrotæa parva, Meade; I think this is *H. glabricula*, Fln., which was previously reputed.

Pegomyia hyoscyami, Pz., and *Winthemi*, Mg., may be erased, the exponents being very unsatisfactory.

Homalomyia triangulifera, Meade (nec Rond.), is *H. lepida*, W., which by some extraordinary chance I omitted from my list, but noticed the omission just in time to include it among the reputed. *H. nigrisquama*, Meade; confirmed.

Cænusia scrupulosa, Zett.; the specimens belong to *Spilogaster*, as at present constituted. *C. pictipennis*, Lw.; Meigen's name of *costata* is more generally accepted, even though he mistakenly called it a *Sapromyza*.

Pteropæcila lamed, Schrk. In including this species in my list I fell into the same error into which Haliday had fallen more than fifty years before. Our British species is the little-known *Toxoneura muliebris*, Harr. (*fasciata*, Mcq.). Consequently *P. lamed* should be excised from my list, and *T. muliebris* added from the reputed list and placed next to *Palloptera* under the *Lonchæidæ*.

Oscinis rapta, Hal.; this should be added to the British species, and *O. rapta*, Mcq., excluded from the reputed species.

These are a few notes upon species concerning which I have arrived at some definite conclusion; but there are hundreds of others upon which I am in doubt. When I published my list I thought I fairly understood the genus *Tanytus* with 19 species; I now think I possess 40 species. In *Simulium* I admitted two species; I now think I possess about ten species. A vast amount of work remains yet to be done, but it had better be done with caution.

Sussex Lodge, Newmarket.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

II. — A PRIORI ANTICIPATIONS.

It will perhaps conduce to clearness if I now quote briefly a few extracts from the notes that I drew up for my own guidance before commencing these experiments. They are not without a moral—seen in the light of later and experimental knowledge; and, anyhow, my readers will thus be travelling along the same route that I myself pursued.

Now the results that I anticipated were to have a twofold significance, *viz.*, from the phylogenetic and the chemical standpoints. *Phylogenetically*, I anticipated finding illustrations of the evolutionary doctrine of the origin of species, and of the various *stages* represented by each species in a natural group or genus,—at least so far as regards colouring,—just similarly, for instance, as Weissmann found in the markings of *Sphinx* larvæ.* Furthermore, I expected to obtain two wholly different lines of results with these colours, according to the nature of the reagents used. I anticipated obtaining (a) *progressive*, and (b) *retrogressive*, modifications; and it also seemed possible that by such results some light might be thrown on classification. And, lastly, similar *markings* in different colours on allied species might be expected to yield a common colour (either progressively or retrogressively) under the influence of the same reagent.

Chemically, I hoped to compile a table of the colours in their biological rank, and noted it as very interesting, when the apparently same colour occurred in different groups, to determine whether it would be affected in the same way (*cf.*, for instance, the yellow of the under wing in the *Triphænæ* and in *Heliaca arbuti*). Only after writing the above did I recollect that Grant Allen (reasoning, however, not from the results of experiments, but from observation alone) had drawn up a table of colours, in their biological rank, for flowers; and it struck me as very interesting to see how far my results might accord with his. I expected that in insects yellow would be found *above* white (*not below*, as in flowers), and *below* red. But what of black (probably above all these), blue, brown, &c.? *That* remained for experiment to show.

Nevertheless, I wrote,—very likely a *linear* arrangement of *all* the colours may be impossible; for as to the ranks of colours, I doubt if there be a universal unity; but rather suspect that a colour may rank below a second colour in one group, and above it in another. I imagine this to be the case from a consideration of the distribution of colour on various insects; broadly speaking,

* 'Essays in Descent' (Meldola's translation), I., 223, &c.

I take it that the ground colour of a wing is the lowest in rank, and primal, whilst bands and markings on it show more highly evolved colours. If so, in *Pieris* and *Colias*, black is above white and yellow; but in *Vanessa atalanta*, below white and red; and so on. This were certainly to assume that the rank of the colours corresponds with their historical order of development. It remains to be seen whether this be a legitimate assumption. Moreover, as regarding the identity of *ground* and *primal* colour, one must remember that a high colour may commence as a band, and end by covering nearly the whole wing, in which case the original ground colour would eventually appear secondary; hence arises a necessity for caution in making such assumptions.

[In view of the experimental results afterwards obtained, I may be permitted to point out that I had thus foretold beforehand the priority of white to yellow (antithetically to Mr. Cockerell's views); and of yellow to red, in order of development. On the other hand, it will appear how utterly fallacious were all my *à priori* speculations on the rank and behaviour of *black*; and also, I fear, on the relations of band and spot colours to ground colour.]

Now, as to *progressive* modifications, I prophesied by far the most interesting and vitally important results from the use of such reagents as the organic acids. For my reagents I divided into two main classes:—1st, those that are naturally present in the insect itself, or in the plants that it feeds upon; and 2nd, those altogether foreign to the insect and plant. In the first class were included such reagents as formic, acetic, malic, citric, succinic, oxalic, benzoic, and tartaric acids, &c.; also, by an extension, such oxidising reagents as potassic permanganate, seeing that oxidation perhaps plays an important part in the evolution of colours; although an objection might of course lie here against such reagents on account of possible chemical action other than oxidation. In the second class I included all such reagents as strong mineral acids (sulphuric, nitric, hydrochloric, &c.); strong alkalis,—ammonia, sodic hydrate, potassic hydrate; and any salts that might be tried, as, *e.g.*, potassic ferro-cyanide, potassic iodide, argentic nitrate, &c. Evidently none of these could affect the insects in nature,—they are all foreign reagents; therefore I considered that no *progressive* modifications could be looked for from the use of these reagents, but merely retrogressive; for it seemed likely that by destroying the present colourings they would reveal the earlier stages. Subsequently, however, I noted that possibly these progressive and retrogressive reagents were too sharply divided, since “unnatural” reagents *might* produce the progressive modifications in experimenting, although in nature such modifications have been brought about by other means.

Now regarding this progressive modification of colour,—although carefully guarding myself against expecting too much, or admitting so sweeping an anticipation as that of producing artificially *all the* stages in coloric development displayed in nature, seeing that such are probably due to the action of more causes than simply the metabolism of the insect; due, for instance, to variations of temperature, atmospheric and climatic conditions generally,—yet I considered that by the external application of such already mentioned organic reagents, as in very small and dilute quantities are present in the insects themselves, I might produce progressive modifications of colour similar to those that have occurred already in many species. I hoped thus to complete changes already commenced in an insect itself, or displayed by closely allied species: for instance, to change the *white* of *Pieris* into the black, already present as spots and tip markings; the white of *Euchloë cardamines* into orange, like the tip; the pale yellow of *Colias hyale* into the deep yellow of *Edusa*; these yellows into black, like the borders; and the yellow of *Gonepteryx rhamni* into the red of *G. cleopatra*. Especially, too, in those species where the males are brilliantly coloured and the females dull, did I anticipate being able to change the female tint into the male (cf., *Lycænæ*, *Euchloë*, &c.).* How utterly fallacious and doomed to disappointment were all these anticipations, will subsequently appear.

Then as to the *retrogressive* modifications,—here, at any rate, the event proves me to have been on somewhat safer ground in my predictions. I have already explained that I expected to find such reagents as the strong mineral acids and the caustic alkalis convert the latest evolved colours backwards to a lower colour, thus giving me the original (*sic*) type colours; and this both as regards the several colours of one species, and the range of colours in a genus of many species. These results would form, therefore, an exact counterpart to those that I fallaciously hoped for in progressive modification. For instance, in *Pieris* I expected to turn all the black into white; in *Euchloë cardamines*, the orange back to white; in *Gonepteryx rhamni*, the red spots to yellow; and in *Vanessa atalanta*, the red into the ground colour, black.

Supposing these anticipations to be fulfilled, the question next occurred to me whether it might be possible by diluting a given reagent, or by taking a less strong one, to retrace retrogressively the colour evolution step by step. For example,—I thought,—a powerful acid may turn *Colias* all white at once; but it would be far more interesting if (by using weaker acid) one

* In this way, too, I hoped to throw some light on various isolated observations regarding the effect of change of diet in producing coloric variation: as, e. g., that *Arctia caia* is far darker when the larvæ are fed on walnut leaves.

could first turn its black into yellow, and then the yellow to white; although, I should add, that in this particular case I fancied the black had never come through yellow at all, but direct from the *Pieris* black, and that from white; but, at any rate, in such an instance as that of *G. cleopatra* and *G. rhamni*, I hoped to reduce the red flush and spots, respectively displayed by them, to the ground yellow, and then this yellow to the type colour of the genus, as shown by the lowest forms. Again, in species displaying so many colours as the *Vanessæ* do, it would be most interesting to find the lineal order of these, although, no doubt, some would be collateral, and not all unilineal.

Then, again, regarding the statement I have already quoted (p. 155, above), that the *same markings differently coloured* in allied species might be expected to yield a common colour on treatment with retrogressive reagents, it appeared to me that a crucial instance would be afforded by the species of *Catocala*, e.g., *nupta* and *fraxini*. Was the blue of *fraxini*, I asked, evolved *via* the red of *nupta* (or *vice versa*), or are not these two colours more probably collaterally divergent? In the first case one might expect this result:—*fraxini*, blue reduces to red: this to “*χ*” *nupta*, red reduces to “*χ*”; but in the second case, both the blue of *fraxini* and the red of *nupta* might be reduced by a common reagent (or by different reagents) to a common colour. An analogous instance to that of these *Catocalæ* is afforded by the two species, *Euchloë cardamines* and *E. eupheno*, in which latter the ground colour is bright yellow, and the tip orange. By thus applying this principle to all genera that display the same markings in different colours, I hoped to discover the actual order of coloric evolution in each species, and the genetic relationship to all the others.

Such were my expectations as regards retrogressive reagents. It will appear that they have been only partly realised, since I have not succeeded in destroying highly evolved colours, step by step, but have never obtained more than *one* retrogressive change.

That the above-stated opinions may be viewed in their proper light, I must again remind my readers that I have simply been quoting to them from notes written out *before I had made a single experiment*. I trust that I have not been unduly prolix in so doing, but it seemed to me that greater coherence and unity would thus be given to my paper than could obtain, did I omit all reference to my previous anticipations, and plunge directly into the experimental results. Moreover, the speculations I had indulged in of obtaining those *progressive* modifications appear to me to carry a moral and a warning, only illustrating once more the utter futility of relying on any *à priori* hypothetical views,—however probable they may seem,—without subjecting them to the test of experiment. Hypotheses certainly are

indispensable; no coherent line of work can be pursued without them; and to grope blindly through a number of disconnected experiments without any clear notion of what we expect to find, or what we are looking for, is to work wastefully, half-uselessly, and stupidly. But hypotheses are valuable only as schemes of working, and utterly illusory without actual verification. Without further comment, however, we will now proceed to consider the actual experiments, and their results.

(To be continued.)

DESCRIPTIONS OF SOME NEW SPECIES OF CHINESE RHYNCHOTA.

By W. L. DISTANT.

I PREVIOUSLY described (*ante*, p. 90) three new species of Cicadidæ, contained in a small collection, placed in my hands by Mr. J. H. Leech. The following descriptions refer to other novelties from the same source, and we may confidently anticipate considerable accession to the number of known species of the order, when the Chinese insect fauna is more available for study.

HETEROPTERA.

Fam. PENTATOMIDÆ.

Subfam. ASOPINÆ.

NEOGLYPSUS OPULENTUS, n. sp.

Ochraceous, thickly covered with dark punctures, and more or less shaded with metallic green; connexivum ochraceous, with a black spot on each side of the segmental sutures. Body beneath and legs pale ochraceous, some small sternal discal spots and the stigmata black. Antennæ dark ochraceous, with the apical halves of the third, fourth, and fifth joints black; joints (excluding basal) almost subequal in length. Head with the lateral margins distinctly recurved; pronotal angles strongly produced into obtuse spines, straight, and directed outwardly. Pronotum and scutellum very coarsely punctate. Corium finely punctate. Long., 20 mm. Exp. pronot. angl., $11\frac{1}{2}$ mm.

Hab. Chang Yang. (Pratt.)

Allied to the only other described species of the genus, *N. viridicatus*, Dist., from Japan, but differing by the obtuse pronotal angles, &c.

Subfam. PENTATOMINÆ.

TROPICORIS ILLUMINATUS, n. sp.

Very dark purplish brown, with the following yellow markings:—A short oblique fascia on each anterior lateral area of the pronotum, and a small central spot on disk of same, the apex of the scutellum, a spot in each lateral angle, and a central longitudinal fascia to same. Connexivum ochraceous, with large blackish spots. Body beneath ochraceous; some central sternal spots, the under side of pronotal angles, stigmata, and a

series of large marginal spots blackish. Legs dark ochraceous, tibiae with a central pale annulation, tarsi pale luteous, with their apices pitchy; rostrum blackish, with the base paler. Antennae blackish, with the fourth joint longest. Pronotum thickly and coarsely punctate, with the lateral angles strongly produced, their anterior margins rounded and serrated, their extreme apices terminating in a short obtuse spine. Scutellum coarsely punctate. Corium thickly and finely punctate. Rostrum long, and reaching the penultimate segment of the abdomen. Long., 16 mm. Exp. pronot. angl., 10 mm.

Hab. Chang Yang. (Pratt.)

This forms, with *T. davidi*, Sign., and *T. armandi*, Fallon, a third Chinese species of the genus.

HOMOPTERA.

Fam. FULGORIDÆ.

Subfam. TESSARATOMINÆ.

EUSTHENES PRATTI, n. sp.

Body above dark chocolate-brown; lateral and anterior margins of pronotum and the connexivum dark olivaceous green; head and scutellum more or less suffused with the same colour; membrane bronzy brown. Body beneath rather paler in hue; lateral areas of the sternum, and an abdominal stigmatal fascia, bright olivaceous green; coxæ and tarsi brownish ochreous. Antennae with the first, second, and third joints blackish; fourth joint ochraceous, with the base narrowly blackish; second joint much longer than the third, and subequal in length to the fourth. Posterior femora in the male with a long spine beneath at base, and two shorter spines at apex. Long., ♂, 28 mm. Exp. pronot. angl., 13 mm.

Hab. Kiukiang and Chang Yang. (Pratt.)

This species is allied to *E. antennatus*, Dist.,* by its elongate body and pale apical joint of the antennae, but in *E. pratti* this joint is black at the base, and the second joint is much longer than the third; the scutellum is also strongly transversely rugose, and its apex is broadly foveate. The colour is described from a *dry* specimen; when alive, the colour is bright greenish, as with other species of the genus.

Subfam. EURYBRACHYDINÆ.

FRUTIS SINENSIS, n. sp.

Head and thorax above and beneath dull ochraceous; abdomen bright sanguineous, with the anal appendage ochraceous; legs ochraceous, tibiae and tarsi fuscous. Tegmina dull ochraceous, and with a curved transverse impressed fascia of the same colour near apex. Wings very pale ochraceous, more or less suffused with creamy white. Long. excl. tegm., 20 mm. Exp. tegm., 53 mm.

Hab. North China. (From coll. Leech.)

* From N. E. India. By a misprint, the dimensions of this species were given as "Long., 35 to 36 mm.," instead of 25 to 26 mm. (Trans. Ent. Soc. Lond., 1887, p. 357).

DESCRIPTIONS OF NEW SPECIES OF PHYTOPHAGOUS
COLEOPTERA RECEIVED BY MR. J. H. LEECH, FROM
CHANG-YANG, CHINA.

By MARTIN JACOBY, F.E.S.

(Continued from p. 118.)

APHTHONA VARIPES, n. sp.

Below and the posterior femora piceous; above metallic blue; antennæ and the four anterior legs fulvous; thorax scarcely visibly (or finely) punctured; elytra distinctly and closely semi-punctate-striate. Length, $\frac{3}{4}$ line.

Head impunctate, the frontal elevations narrowly oblique, like the carina, distinctly raised; antennæ scarcely extending to half the length of the body, fulvous, or with the terminal joints slightly darker, the second joint thickened, the third and fourth more elongate, nearly equal; thorax about one-half broader than long, the sides nearly straight, the anterior angles slightly thickened, the surface sparingly impressed with minute punctures; scutellum black; elytra rather strongly and closely punctured, the punctures arranged in somewhat regular rows, the posterior portion more obsoletely punctate.

Very closely allied to *A. Bonvouloiri*, Allard, from Syria, but narrower and rather smaller, the antennæ and legs less robust, and the elytral punctuation much closer and finer; from *A. modesta*, Weise, distinguished by the differently coloured legs, and the scarcely perceptible punctuation of the thorax; from *A. trivialis*, Weise, by the colour of the under side and that of the antennæ. *A. chinensis*, Baly, differs by the colour of the antennæ, the nearly quadrate thorax, and its larger size.

Many specimens.

LUPEROCNEMUS, Fairm.

This genus was described by Fairmaire in the Belgian Annals of 1888. The author has said nothing about the state of the anterior coxal cavities, nor given the length of the posterior tarsi, consequently it is impossible to come to a conclusion in regard to the systematic position of the genus. There are, however, two specimens contained in this collection, which answer entirely the description of Fairmaire's *L. xanthoderus*, and I consequently refer these insects to this species; the anterior coxal cavities are open, and the posterior tibiæ have a distinct spine (Fairmaire describes them as unarmed); the first joint of the posterior tarsi is as long as the two following joints together. In spite of the distinctly incrassate posterior femora mentioned by the author, Fairmaire places his genus amongst the *Galerucinae*, which would put an end to all classification as far as the *Halticinae* are concerned, since this development of the posterior femora is the principal character by which this family may be separated from the *Galerucinae*; whether the insects have saltatorial powers or

not cannot affect their systematic position, consequently *Luperocnemus* must be placed in the *Halticinae*, probably near *Sutrea*, Baly.

HESPERA SERICEA, *Weise* (Pl. I. fig. 11).

This genus, the type of which has quite the appearance of a species of *Luperodes* is much distinguished by the fine pubescence which covers the entire upper surface as well as by the shape of the thorax and the comparatively slender legs. I may add to the description of the author, that the space separating the basal lobe of the prosternum from the thoracic basal margin is so small as to be scarcely perceptible, so that the anterior coxal cavities may almost be considered closed; in most of the specimens obtained by Mr. Pratt, which agree otherwise with the author's description, the first three joints of the antennæ and the base of the anterior femoræ are fulvous.

CREPIDODERA OBSCURITARSIS (?), *Motsch.*

The short description of the author agrees sufficiently with the specimens obtained at Chang Yang to refer them to this species. The insect is of a reddish-fulvous colour, with the terminal eight joints of the antennæ, the apex of the posterior femoræ and the tarsi fuscous or nearly black; the antennæ have their third and fourth joints equal; the thorax is nearly twice as broad as long, the sides are rounded before the middle, and the anterior angles are oblique and thickened, the surface is transversely convex with a few extremely fine punctures, but the deep transverse sulcation is much more distinctly punctured and bounded at the sides by a deep longitudinal groove. The elytra are finely punctate-striate, the striæ themselves rather sinuate and very indistinct near the apex, the interstices are not visibly punctured (which does not agree with Motschulsky's description); the under side and legs are finely covered with greyish pubescence. Apparently rather common.

CHALCOIDES PICIPES ?, *Weise*.

I refer the specimens contained in this collection to this species, although I do not quite see the differences between it and *C. chloris*, Foudr. I referred to the latter species specimens obtained by Mr. Lewis at Japan, and do not find any perceptible difference in the Chinese specimens, which are variable in regard to sculpture and colour. *Weise* compares *C. picipes* to *C. aurata*, Marsh, from which it is no doubt distinct, but his description of *C. chloris* is almost identical with *C. picipes* (both have the first four joints of the antennæ and other characters in common), and but little reliance can be placed on slight variations in sculpture and colour, as our European varieties show.

NONARTHRA NIGRICEPS, Weise (Pl. II. fig. 1).

Weise has described this species from a form in which the elytra are entirely pale testaceous and which I look upon as a variety. Amongst the very numerous specimens contained in this collection three forms may be distinguished: (1), elytra with a spot on the shoulder, the apex and a transverse band below the middle, black; (2), elytra with the humeral spot wanting; (3), elytra entirely testaceous or with a narrow posterior dark lateral and sutural margin; all other characters agree with the description of the author.

Many specimens.

LUPERODES BIPARTITUS, n. sp. (Pl. II. fig. 8).

Flavous; the head, antennæ, tibiæ and tarsi, black; thorax transversely sulcate, black, the base fulvous. Elytra finely punctured, the basal half fulvous, the rest flavous. Length, $1\frac{1}{2}$ —2 lines.

Head impunctate, shining, black, the frontal elevations ill-defined, clypeus triangularly thickened, antennæ extending beyond half the length of the body, black, the lower three joints piceous, the fourth joint double the length of the third; thorax transverse, rather more than twice as broad as long, the sides slightly narrowed at the base, narrowly margined, the anterior angles thickened but not produced, the surface with a very distinct transverse sulcation, extending nearly to the sides, the anterior portion with a few minute punctures, black, the basal portion fulvous; scutellum triangular, smooth, fulvous; elytra scarcely narrowed posteriorly, very finely and moderately closely punctured, the interstices slightly rugose here and there and furnished with a few short pale hairs, the basal portion fulvous, this colour changing gradually to flavous towards the middle of the elytra, their epipleuræ extending nearly to the apex; under side and the femora flavous: the first joint of the posterior tarsi as long as half the tibiæ, the latter with a distinct spine; anterior coxal cavities open.

The rather peculiar coloration of this species distinguishes it from any of its allies.

Many specimens.

LUPERODES PRÆUSTUS, Motsch.

There is no doubt that this species is the male insect of *Luperodes nigripennis*, Motsch., which has already been remarked by Weise. Numerous specimens of both forms have been obtained at Chang-Yang, amongst which are some slightly intermediate in regard to coloration. All the specimens of *L. præustus*, however, are males, which may be known not only by their different elytral colour, but by a small but distinct depression placed at the suture below the scutellum, which is never present in the female (*L. nigripennis*); the last abdominal segment in the male has also an incision at each side. *L. præustus* is also found at Japan. From that locality I have, however, two female specimens, which have the coloration of the male (although not differing in any other way); thus proving that the elytral colour is not always to be relied on in determining the sexes of this *Luperodes*.

LUPERUS PRATTI, n. sp.

Black; the lower portion of the head, the base of the antennæ and the legs, flavous; head and thorax impunctate; elytra scarcely perceptibly punctured. Length, $1\frac{1}{2}$ line.

Head entirely impunctate, shining, black, the lower portion obscure flavous or testaceous (sometimes piceous), the frontal tubercles strongly raised and broad in shape, the carina short; antennæ stout and rather short, about half the length of the body, the three or four lower joints flavous, the rest black, the third joint scarcely longer than the second one; thorax about one-half broader than long, the sides scarcely rounded, straight near the base, the angles obsolete, the surface entirely impunctate; elytra extremely finely punctured, the punctures only visible with a very strong lens, the interstices smooth, here and there furnished with single erect hairs; under side black; legs flavous, the base of the femora sometimes darker, the first joint of the posterior tarsi not longer than the two following joints together; the tibiæ with a small spine.

The pale lower portion of the face, the entirely impunctate thorax, and the extremely finely punctured elytra separate *L. pratti* from several European species with a similar black upper and under surface and pale legs. Amongst the rather numerous specimens obtained a variety is present in which the lower portion of the face and the legs are partly piceous, and it is possible that specimens may be found in which these parts are entirely black. The present species cannot be confounded with *L. capito*, Weise, on account of the black elytra and abdomen.

LUPERUS HIRSUTUS. (Pl. II., fig. 9.)

This species, described by myself from Japan (Proc. Zool. Soc., 1885, p. 742), was obtained numerously at Chang-Yang.

LUPERUS ÆNESCENS?, Weise.

I refer very doubtfully a small *Luperus* to Weise's species. This and several others, lately described by this author, are so closely allied to *L. flaviventris*, Motsch., that it is almost impossible to determine these similarly coloured species without a comparison of the types, especially as varieties in regard to punctuation and even shape have been described by the same author. The present insect is of metallic-green colour above, the abdomen being (as in several others of its congeners) flavous. Weise describes, however, the punctuation of the thorax in nearly all of his species as obsolete ("verloschen"); in the insect before me the thorax is closely and distinctly punctured, the punctures being of different sizes; the elytra also are very distinctly and closely punctate, with the interstices slightly rugose; the shape of the thorax in this and most of the allied species is subject to variation, according to the sexes; in the male it is scarcely broader than long, in the female it is distinctly broader; the antennæ also vary in length, according to the sexes, and this variation prevents a certain determination, when

so many closely-allied forms are concerned. The length of the present species is $1\frac{1}{2}$ line.

LUPERUS CAPITO, Weise.

Var. The head (the vertex excepted), thorax, and elytra and legs, testaceous.

Of this very variable little species, Weise has described four varieties. A fifth is contained in this collection, together with the typical form. In this variety the entire insect, with the exception of the apical joints of the antennæ and the vertex of the head, is flavous or testaceous; some specimens, showing traces of the metallic blue colour of the elytra in the type, are also before me. The description of the author agrees with my specimens, with one exception, in regard to the anterior margin of the thorax, which is described as being strongly concave; in the specimens from Chang-Yang, the same margin is nearly straight. Apparently common.

LUPERUS BIPLAGIATUS, n. sp. (Tab. II., fig. 10.)

Flavous; thorax transverse, minutely punctured; elytra very finely punctured in rows, each with a black or piceous spot near the apex. Length, 1 line.

Head with a few very fine punctures at the vertex, deeply transversely grooved between the eyes; frontal elevations transverse, strongly raised; antennæ more than half the length of the body, flavous, the terminal joints slightly darker and thicker, the third and fourth joints nearly equal, elongate; thorax transverse, twice as broad as long, the sides slightly rounded at the middle, the angles slightly thickened, but not produced, the surface very finely and not closely punctured, with two or three very obsolete small depressions, flavous; elytra closely and more distinctly (though finely) punctured than the thorax, flavous, each with a piceous ovate spot near the apex; under side and legs flavous, the tibiæ with a very small spine; the first joint of the posterior tarsi as long as the three following joints together; claws appendiculate; anterior coxal cavities open.

This small species, although possessing the structural characters of *Luperus*, differs from the more typical species of that genus in the transversely-shaped thorax and the small tibial spines; its size and coloration will distinguish it from its allies. Numerous specimens were obtained.

GALERUCA (ADIMONIA) GRISKO-VILLOSA, n. sp.

Ovate, widened behind, dark fuscous or piceous; above obscure testaceous, finely pubescent; head finely, thorax strongly, punctured, the sides subangulate; elytra very closely punctured without costæ, clothed with greyish long pubescence. Length, $2\frac{1}{2}$ —3 lines.

Head rather broader than long, finely rugose-punctate throughout; the clypeus with a distinct longitudinal ridge, extending upwards between the antennæ; palpi but slightly incrassate, the terminal joint acutely pointed; antennæ filiform, extending to half the length of the elytra, black, the basal joint testaceous below, the second one slightly shorter than any of the following joints; thorax transverse, about twice and a half as broad as long, the sides distinctly emarginate below the middle, the upper portion forming

a rounded angle, the posterior margin sinuate near the posterior angles, the surface with a shallow lateral and a more distinct longitudinal central depression, closely and somewhat rugosely punctured, the punctures larger at the sides than at the middle of the disc; scutellum broad, finely punctured; elytra punctured like the middle portion of the thorax, and sparingly clothed with long greyish white hairs; legs and under side more or less fuscous, the femora sometimes dark fulvous at the base; the tibiae unarmed; the first joint of the posterior tarsi as long as the two following ones together; claws bifid; anterior coxal cavities closed.

In the shape of its thorax, the present species resembles somewhat *G. tanacetii*, but its much smaller size, the absence of any elytral costæ, and the apparently unarmed tibiae (even when seen with a powerful lens), will distinguish *G. griseo-villosa*.

Four specimens.

GALERUCA CHINENSIS, n. sp.

Ovate, convex, rufous; the antennæ, scutellum, and the apex of the femora and the tibiae and the tarsi, black; thorax and elytra finely rugose-punctate, clothed with short yellow pubescence. Length, 2 lines.

Var. Legs entirely black.

Head finely rugose, opaque, the clypeus raised into a strong triangular ridge, labrum partly black, palpi rather slender; antennæ rather stout, scarcely extending to half the length of the body, the lower two joints shining, stained more or less with fulvous below, the others black, opaque, the third joint the longest (except the first), the following nearly equal and shorter; thorax more than twice as broad as long, the sides strongly rounded at the middle, the angles in shape of a small tubercle, the surface with a shallow depression at the sides, and a deeper longitudinal groove at the middle, closely and rather finely rugose-punctate, and sparingly clothed with very short yellow pubescence; scutellum black, finely punctured; elytra sculptured and pubescent, like the thorax; posterior tibiae with a small spine; the first joint of the posterior tarsi scarcely longer than the second one; claws bifid.

In shape and colour this species resembles greatly *G. rufa*, Germ., and several North American forms, from all of which it is separated by the finely, not coarsely, rugose thorax and elytra, and the colour of the scutellum and legs.

Three specimens.

CNEORANE APICICORNIS, n. sp.

Fulvous; antennæ (the terminal joints excepted), the mesosternum and abdomen, the tibiae and the posterior legs, blackish blue; elytra closely semi-rugose punctate, violaceous. Length, 3 lines.

I am obliged to describe this species as new, since it does not agree with any of the rather numerous and closely allied forms of which it may possibly be a variety. It will be sufficient to point out its principal distinctive characters. There are only about four species with which *C. apicicornis* can be compared, on account of the dark colour of the posterior legs and anterior tibiae; these are *C. elegans*, Baly, *C. rufo-carulea*, Fairm., *C. intermedia*, Fairm., and *C. femoralis*, Jac. From these and all others (*C. fulvicollis*, Baly, excepted, which has also fulvous terminal joints of the antennæ, which are, however, incrassate in

the male) *C. apicicornis* differs in the (generally) three fulvous apical joints of the antennæ (in some specimens the apical one only is of that colour). It is a much smaller insect than *C. femoralis*, Jac., and the elytra are much more shining, less strongly rugose-punctate, and violaceous instead of blue. *C. rufocærulea*, Fairm., is described as being smaller than *C. elegans*, Baly ($4\frac{1}{2}$ to 5 mill.), which is one of the smallest species; all others differ in the colour of the breast, and partly of the legs. The thorax in the present species is broader than long, the sides are rather strongly rounded at the middle, and the surface is not visibly punctured; the antennæ, which are longer than half the length of the body, have the three basal joints more or less fulvous below.

More than twenty specimens which were obtained agree in the above particulars.

CNEORANE ABDOMINALIS, n. sp.

Dark violaceous blue; the antennæ black; thorax extremely finely punctured; elytra distinctly punctate; abdomen fulvous. Length, 2—2½ lines.

Head impunctate, the frontal tubercles narrow, oblique; carina acutely raised; palpi slender, piceous; antennæ filiform, black, more than half the length of the body, the third joint one-half longer than the second, but shorter than the fourth; thorax scarcely broader than long, the sides widened at the middle, the anterior angles slightly thickened, but scarcely produced, the surface with a few very minute punctures, only visible with a powerful lens; scutellum broad, black, impunctate; elytra nearly parallel, very finely, closely, and irregularly punctured; tibiæ unarmed; the first joint of the posterior tarsi as long as the two following joints together; claws appendiculate; anterior coxal cavities closed.

C. abdominalis, which may be known from any of its congeners by its uniformly dark blue colour and the flavous abdomen, possesses all the structural characters of *Cneorane*. It greatly resembles *Luperus flaviventris*, Motsch., in coloration, but is at once distinguished from that species by the unarmed tibiæ and other structural differences.

Half a dozen specimens.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

CHEMISTRY OF INSECT COLOURS.—The kind response that my request for specimens for this investigation (Entom. 131) has already met with, emboldens me to ask if any readers of this journal can let me have a specimen or two each of the following British species, which I should like to examine in time to tabulate and publish the results in their proper connection with those already to hand. As previously explained, broken specimens will answer perfectly; and I need only the wings. It will be noticed that several of these present desiderata are *green*,—a colour

sufficiently uncommon to make me anxious to examine it in as many and as unrelated species as possible, in order to supplement the not altogether uninteresting results that I have already obtained from green Lepidoptera. The species desired are:—*L. pectinaria*, *C. psitticata*, *C. miata*, *D. orion*, *A. præcox*, *A. aprilina*, *A. herbida*, also *B. parthenias* or *B. notha*, *P. chrysis* (or any allied metallic-marked species), *T. fimbria*, *P. hamula*, *F. conspicuata*, *T. amataria*, *C. ferrugata*, *C. munitata*, *N. russula*, *L. arion*, and—were it not asking too great a rarity—*H. auroraria* and *A. rubricata*.—F. H. PERRY COSTE.

GAS-LAMP ENTOMOLOGY.—As the question whether the Sphingidæ are attracted by the light from gas-lamps is still being discussed in the 'Entomologist,' it may be of interest to mention that I have on more than one occasion taken *Smerinthus populi* at gas-lamps in this neighbourhood. It may also be worth mentioning that in August, 1887, I took a specimen of *Macroglossa stellatarum* on the window of a public-house on the road from Broadstairs to St. Peters, in the Isle of Thanet. The insect had evidently been attracted by the gas in the public-house, and had got caught between the glass of the window and a sliding piece of glass running parallel to it about half an inch away, and extending about two feet up the window, on which the name of the establishment, or some other notice, was engraved.—HENRY A. HILL; 132, Haverstock Hill, N.W., April 2, 1890.

With regard to taking Sphingidæ at light, I may mention that the electric-light at Davos Platz is often visited by *Sphinx convolvuli* and *Deilephila euphorbiæ*, but owing to the height of the lamps it is very hard to work them successfully. Last year a friend showed me a great many Sphingidæ taken at light in the Engadine, chiefly *D. euphorbiæ*.—LEONARD S. SELLON; Thusis, Grisons.

NOTES ON LEPIDOPTERA FROM ABERDEEN AND KINCARDINESHIRE.—

During the last three seasons I have collected in the above two shires of Scotland, and have done my best to become acquainted with all the species to be obtained in those counties. With the help of some of my fellow-collectors, I have managed to compile a very respectable list, as follows:—*Pieris brassicæ*, *P. rapæ*, *P. napi*, all common. *Argynnis selene*, *A. aglaia*, common in marshy places. *Vanessa polychloros*, occasionally; *V. urticæ*, common in spring and autumn; *V. atalanta*, *V. cardui*, occasionally common. *Erebia epiphron*, scarce; I have not taken this species myself. *Satyrus semele*, common on the coast. *Epinephele ianira*, common everywhere. *Cænonympha typhon*, common, but local; *C. pamphilus*, common. *Thecla rubi*, common, but local. *Polyommatus phlæas*, common in spring and autumn. *Lycæna astrarche*, var. *artaxerxes*, common, but local; *L. icarus*, common; *L. minima*, common along the coast. *Acherontia atropos*, one taken by a fisherman last year; I have heard of others being taken before I collected. *Sphinx convolvuli*, five taken; two of these I have. *Deilephila galii*, four taken; three by other collectors, and one by myself. *Charocampa celerio*, one taken by myself in a clothier's shop in George Street, Aberdeen, during my first year; I have not heard of any other specimen being taken; *C. porcellus*, occasionally common along the coast. *Smerinthus populi*, larvæ, very common. *Zygæna exulans*, not uncommon; I have not taken it myself; *Z. filipendulæ*, common along the coast. *Hylophila prasinana*, occasionally. *Nudaria mundana*, common along the coast of Kincardineshire. *Lithosia lurideola*, occasionally.

Nemeophila plantaginis, common. *Arctia caia*, common. *Spilosoma menthastri*, common, but local. *Hepialus humuli*, common; *H. velleda*, common; *H. lupulinus*, common, but local; *H. hectus*, occasionally. *Dasychira fascelina*, not uncommon in marshy places. *Orgyia antiqua*, larvæ, common on willows. *Bombyx rubi*, *B. callunæ*, common on the heath. *Saturnia pavonia*, also common on heath. *Dicranura furcula*, larvæ, occasionally; *D. vinula*, larvæ, common. *Lophopteryx camelina*, larvæ, occasionally. *Notodonta dictæa*, sometimes very common; *N. dromedarius*, larvæ, occasionally. *N. ziczac*, larvæ, common. *Thyatira batis*, occasionally common at sugar. *Bryophila perla*, occasionally at light. *Demas coryli*, larvæ, occasionally. *Acronycta psi*, common; *A. runicis*, occasionally; *A. menyanthidis*, *A. myricæ*, not uncommon at sugar. *Leucania conigera*, common along the coast; *L. lithargyria*, occasionally common; *L. impura*, *L. pallens*, common. *Tapinostola fulva*, not common. *Hydræcia nictitans*, common; *H. micacea*, also common, mostly at light. *Xylophasia rurea*, very common; *X. lithoxylea*, common, but local; *X. monoglypha (polyodon)*, very common. *Charæa graminis*, common on the ragwort. *Cerigo matura*, not common. *Luperina testacea*, common at sugar, and also at light. *Mamestra albicollis*, not uncommon along the coast; *M. furva*, not very common; *M. brassicæ*, common. *Apamea basilinea*, common; *A. gemina*, also common; *A. unanims*, rare; *A. didyma*, very common. *Miana strigilis*, not common; *M. fasciuncula*, very common; *M. literosa*, not so common as the former. *Celæna haworthii*, sometimes common. *Stilbia anomala*, rare; I have not taken it myself. *Caradrina quadripunctata*, common all the year round. *Rusina tenebrosa*, males common, but females rare to find. *Agrotis vestigialis*, common on the ragwort along the coast; *A. suffusa*, sometimes common in spring and autumn; *A. segetum*, very common, mostly along the coast; *A. exclamationis*, also very common; *A. cursoria*, *A. nigricans*, *A. tritici*, very common along the coast on the ragwort, also at sugar; *A. agathina*, rare; *A. strigula (porphyrea)*, flying very commonly when beginning to get dusk; *A. simulans*, occasionally, but not common. *Noctua glareosa*, *N. augur*, *N. plecta*, *N. c-nigrum*, always common; *N. triangulum*, sometimes common; *N. brunnea*, *N. festiva*, v. *conflua*, *N. dahlia*, *N. rubi*, *N. umbrosa*, *N. baia*, *N. neglecta*, sometimes very common where there is heath; *N. sobrina*, occasionally, but not common; *N. xanthographa*, very common everywhere. *Triphæna ianthina*, occasionally; *T. fimbria*, rare; *T. comes (orbona)*, very common; I was informed of one of the rare *T. orbona (subsequa)*, taken near here, but when I saw the specimen I found it was only an uncommon form of *T. comes*; *T. pronuba*, common; I have seen this species on the wing from June to October. *Amphipyra tragopogonis*, not common. *Mania typica*, common. *Panolis piniperda*, not common. *Pachnobia rubricosa*, common. *Tæniocampa gothica*, common. *Orthosia suspecta*, common, but local; *O. macilenta*, also common and local. *Anchocelis rufina*, very common; *A. litura*, sometimes common. *Cerastis vaccinii*, common in spring and autumn. *Scopelosoma satellitia*, common and local. *Xanthia fulvago (cerago)*, sometimes common; *X. flavago (silago)*, not so common; *X. circellaris*, common. *Calymnia trapezina*, not common. I have one of the *Dianthæciæ* that was named for me as *D. compta*, but has been doubted; *D. cucubali* has been taken here, but not common. *Polia chi*, common, but local. *Dasypolia templi*, occasionally. *Aporophyla lutulenta*, not common, mostly along the coast; *A. nigra*, sometimes

common. *Melitis asperanthus*, occasionally. *Agriopsis aprilius*, not common. *Euplexis lucipera*, sometimes common. *Phlogophora meticulosa*, occasionally, but not common. *Aplecta graminea*, *A. occulta*, *A. tinctoria*, has been taken here, but not common. *Eudonia abata*, very common; *H. glauca*, not common; *H. festiva*, common, mostly on the coast; *H. oleracea*, common everywhere; *H. pini*, fairly common, the larva is found commoner than the insect; *H. thalassius*, not common; *H. rectilinea*, sometimes common, but has been scarce this year. *Calocampa retusa*, *C. exoleta*, common in spring and autumn. *C. solidaginis*, common at rest on trunks of fir trees, and also comes freely to sugar. *Cucullia umbratica*, not common. *Gonomyia libanica*, very local, and not common. *Hobrosta tripartita*, common. *Plusia chrysis*, common amongst nettles; *P. bractea*, rare; *P. festiva*, rare; *P. pulchra*, common; *P. gamma*, common in spring and autumn; *P. interrogationis*, sometimes common. *Anarta myrtili*, flies commonly when the sun shines. *Chariclea umbra*, rare. *Phytometra viridaria*, occasionally. I have been informed of one *Catocala fraxini*, taken at sugar in Aberdeen about the end of September this year. *Rumia latellata*, common everywhere. *Metrocampa margaritaria*, common and local. *Ellipsis prosoparia*, also common and local. *Selenia bilunaria*, common. *Odonoptera bidinata*, common. *Oreocallis elingaria*, common. *Boarmia gemmaria*, very common. *Gnaphis obscuraria*, local and not common. *Geometra populearia*, common, but local; I have not taken this species myself. *Acidalia aversata*, common, but local. *Cabera pusaria*, also common, but local. *Macaris liturata*, occasionally. *Scodionia belgaria*, scarce. *Fidonia carbonaria*, rare. *Ematurga atomaria*, common. *Bupalus piniaria*, very common. *Abraxas grossulariata*, common in gardens. *Chimantobis brumata*, *C. boreata*, common. *Oporabia dilutata*, common; *O. autumnaria*, not common. *Larentia didymata*, *L. multistrigaria*, *L. caxiata*, *L. viridaria*, always common. *Emmelesia albulata*, common along the coast; *E. minusata*, not common. *Eupithecia oblongata*, common; *E. satyrata* v. *callunaria*, common, but local; *E. indigata*, also local; *E. nanata*, *E. vulgata*, *E. lariciata*, common; *E. pumilata*, common, but local. *Thera variata*, common; *T. firmata*, not common. *Hypsipetes ruberata*, rare; *H. trifasciata*, fairly common, but local; *H. sordidata*, common everywhere. *Melanthia bicolorata*, common, but local; *M. ocellata*, common; *Melanippe sociata*, common; *M. montanata*, *M. fluctuata*, also very common. *Anticlea nigrofasciaria*, rare. *Coremia unilata*, common; *C. designata*, scarce. *Camptogramma bilineata*, common everywhere. *Cidaria miata*, occasionally; *C. truncata*, *C. immanata*, *C. suffumata*, *C. silacea*, *C. prunata*, *C. testata*, *C. populata*, *C. fulvata*, *C. dotata*, always common. *Eubolia limitata*, common; *E. plumbaria*, common, but local. *Anaitis plagiata*, common. *Chesias spartiata*, common; *C. rufata*, not common. *Tanagra atrata*, common along the coast. I have not yet done much in collecting Micro-Lepidoptera here, but I intend to work these next year, and hope to be able to give a good report of the species that occur here.—L. G. ESSON; 46, North Charlotte Street, Aberdeen, N. B.

HYPSPIPETES SORDIDATA (= ELUTATA).—It would be interesting if entomologists, working districts where both the sawfly and bilberry forms of this species occur, would make notes of the times of appearance of each form. In North Devon, I noticed that the smaller specimens, whose larvæ feed on bilberry, had passed their zenith before the larger, sawfly-feeding speci-

mens were out in any number. Observations bearing on this question would be valuable.—RICHARD SOUTH.

HESPERIA LINEOLA.—I find that I have a very much worn specimen of this butterfly, which was captured within a few miles of Sudbury, Suffolk, in July, 1886.—V. GERRARD; 47, Foulden Road, Stoke Newington, N., April 22, 1890.

EARLY APPEARANCE OF *DASYCHIRA PUDIBUNDA*.—On Jan. 28th I found a male *Dasychira pudibunda*, flying against the window inside the billiard-room. I suppose the larva must have got inside the house and pupated there, and been "forced" by the warmth of the room, unless the unusually mild weather had induced it to emerge from the chrysalis out of doors, and the moth had got into the house afterwards, which I should hardly think likely.—W. M. CHRISTY; Watergate, Emsworth, Hants.

BRITISH DIPTERA.—Mr. Brunetti, in his notes on Diptera (Entom. 122), has in several cases given incorrect localities. The following should be Wyre Forest, not Birmingham:—*Scenopinus fenestralis*, *Dolichopus brevipennis*, *Pyrophana rosarum*, *Xylota abiens*, *Microdon devius*, *Lasiops semicinerea*. I have also taken *Sapromyza platycephala*.—R. C. BRADLEY; 252, Mosely Road, Birmingham.

LOCALITY LABELS FOR SPECIMENS.—Although many entomologists in this country make a practice of affixing labels, bearing locality and date of capture, to the insects in their collection, it is rather the exception than the rule that specimens one receives from, or sends to, correspondents have any such data attached. The reason for this is obvious. To write the necessary number of tiny labels for our own cabinet specimens entails the expenditure of considerable time and patience; so if we were to supply the pins of our duplicates also with "tickets," the time we have to devote to entomological work would be seriously encroached upon. Of course information concerning localities and dates are generally obtainable, and are to be had from our correspondents for the asking; but this often means additional letter writing and postage, even if one ignores the possible element of doubt which may enter into the matter. It is, perhaps, not too much to say that the custom of "localising" specimens would be more general than it is if the business could be done with greater facility and expedition. Writing these labels is tedious work, but to have them printed in small quantities would be expensive. If, however, they could be obtained in England, as on the continent, in sheets, it is probable

"That some would label then who never did before,
And those who had begun would label many more."

If these remarks should come under the notice of anyone connected with printing, perhaps he might conceive the idea of publishing a series of labels as an experiment. If so, I would suggest that unless he is prepared to do the thing in a large way, it would hardly be worth doing at all. The first step would be, of course, to ascertain as far as possible the localities most likely to be required. This could be done by inviting entomologists to furnish lists of places that would be useful to them, and which they would use if printed. When a sufficient number of localities were received, they could be arranged in series representing the following divisions of Great Britain:—Scotland: 1. Highlands; 2. Lowlands; 3. Isles. England and

Wales: 1. North; 2. South; 3. East; 4. West; 5. North-east; 6. North-west; 7. Midlands, N.; 8. Midlands, S.; 9. South-east; 10. South-west. Ireland: there are, unfortunately, so few collectors in Ireland, that one series for this country would probably suffice, even, perhaps, if the Isle of Man were included therewith. The dates could not be printed on labels in series for general use, but these could be quickly and easily written, either on the back or face of the label, thus:—4.90 = April, 1890.—R. S.

ERRATA.—P. 132, line 6 from top, for "my" read "any." P. 160, line 11, for "Fallon" read "Fallou"; line 13, "HOMOPTERA.—Fam. FULGORIDÆ" should be placed so as immediately to precede "Subfam. EURYBRACHYDINÆ."

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—April 2nd, 1890.—Mr. Frederick DuCane Godman, M.A., F.R.S., Vice-President, in the chair. Mr. G. Bryant, of 6, Oakley Crescent, Chelsea, S.W.; Mr. A. E. Hall, of Norbury, Pitts Moor, Sheffield; Mr. J. J. F. X. King, of 207, Sauchiehall Street, Glasgow; Mr. H. C. Oakshott, of De Beauvoir House, Falmouth; Mr. A. E. Stearns, of the Lodge, Upper Halliford, Walton-on-Thames; and Mr. G. Vigers, of Hersham, Surrey, were elected Fellows; and Mr. A. B. Farn was admitted into the Society. Mr. Godman announced the death of Mr. Joseph S. Baly, of Warwick, the well-known coleopterist, who had been a member of the Society for the last forty years. Dr. Sharp exhibited and made remarks on a female specimen of a coleopterous insect—*Temnochila quadricollis*, Reitt.—which was the subject of a very unusual malformation of the nature termed "ectromélie" by Lacordaire. Mr. R. W. Lloyd exhibited three specimens of *Elater pomona*, taken at Brockenhurst, in the New Forest, about the middle of March last. Colonel Swinhoe exhibited, and read notes on, a number of butterflies of the genus *Euthalia*. He pointed out that the specimens described as a species by the name of *Euthalia sedea* were only the females of *E. balarama*. Mr. T. R. Billups exhibited male and female specimens of *Cecidomyia salicis-siliqua*, Walsh, which had just emerged from galls received from Mr. Cockerell, who had collected them on a species of willow in Colorado. He also exhibited three species of Ichneumonidæ new to Britain, viz., *Ichneumon haglundi*, Holmgr., bred by Messrs. Adkin and Barker from *Arctia fuliginosa*; *Phygadeuon rufo-niger*, Bridg., taken in Ashdown Forest in November, 1885; and *Phygadeuon sodalis*, Tasch., taken at Dulwich in June, 1889. Mr. C. G. Barrett exhibited specimens of *Bryotropha obscurella*, Hein, and *Doryphora elongella*, Hein, two species of Lepidoptera new to Britain. Dr. Thallwitz, of Dresden, contributed "Notes on some species of the genus *Hilipus*." These notes had reference to a paper on the genus *Hilipus*, by Mr. F. P. Pascoe, published in the 'Transactions' of the Society for 1889. Mr. E. Meyrick read a paper entitled "The Classification of the Pyralidina of the European Fauna." Mr. Kirby, Mr. McLachlan, Mr. Stainton, Capt. Elwes, and Mr. Barrett took part in the discussion which ensued. Prof. Westwood communicated a paper

entitled "Notes on certain species of Cetoniidæ." Mynheer P. C. T. Snellen, of Rotterdam, contributed a paper entitled "A Catalogue of the Pyralidina of Sikkim collected by H. J. Elwes and the late Otto Möller," and Capt. Elwes read certain notes on the foregoing paper as an Appendix. Mr. W. L. Distant, Colonel Swinhoe, Mr. M'Lachlan, and Mr. Jacoby took part in the discussion which ensued. — H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. — *March 27th*, 1890. — J. T. Carrington, F.L.S., President, in the chair. Mr. C. G. Barrett exhibited a series of *Dianthæcia carpophaga*, Bork., showing fully its connection with its variety *D. capsophila* Dup., a specimen of *D. luteago*, Hb., v. *barrettii*, Dbl., all reared by Mr. Blandford, from larvæ found in South Wales; specimens of the original *Catoptria parvulana*, Wilk., taken by Messrs. Bond and M'Lachlan, with recent specimens reared and taken by Messrs. Fletcher, Bankes, and Vine, with intermediate forms, which Mr. Barrett stated proved its identity with *C. scopoliana*, Haw.; also a specimen of *Botys mutualis* (a native of Asia and Africa), taken by Mr. Gregson some years ago, in Lancashire, doubtless accidentally introduced. Mr. Adkin, examples of *Hibernia rupicapra*, Hb. Mr. Joy, an immature specimen of *Mantis religiosa*, from the Suez Canal. Mr. T. R. Billups, several species of Ophionides, bred by members of the Society; amongst others *Paniscus testaceus*, Gr., and *P. cephalotes*, Holmg. and *Ophion luteum*, L., bred by Mr. Barker from the larvæ of *Dianthæcia capsicola*, Hb., the latter species also being reared by Mr. Wellman from *Hadena pisi*, L., and by Mr. South from *Toxocampa cracca*, Fr. Mr. Billups called particular attention to the fact that the cocoons of *Ophion luteum* differed considerably according to the host from which bred. He also called attention to the extreme variability in size of *Paniscus cephalotes*, two females taken by himself at Hayling Island in 1866 being not above one-third larger than the female bred by Mr. Barker. In the same box were shown *Banchus moniliatus*, Holmg., bred from the larvæ of *Panolis piniperda*; also both sexes of *Exetastes osculatorius*, Fab., from the larvæ of *Retinia pinicolana*, Dbl., by Messrs. South and Adkin. Among Mr. Billups's other exhibits were a specimen of *Phygadeuon sodalis*, Tasch., taken in his own garden, June 1st, 1889, and a female of *Hemiteles macrurus*, Tasch., taken at the same place, August, 1889, both species being new to Britain; *Phygadeuon (Microcryptus) rufoniger*, a species new to science, one of several females taken by Mr. Billups in Ashdown Forest, November, 1885, was stated to have been described by Mr. Bridgman in the 'Transactions' of the Entomological Society for 1889. Mr. Perks showed pond-life from Barnes Common, and Mr. Tugwell and Mr. Step exhibited botanical specimens and contributed remarks on their respective exhibits.

April 10th. — The President in the chair. Lieut. E. W. Brown and Mr. R. McAllan were elected members. Mr. Tugwell exhibited a series of *Tephrosia crepuscularia*, W. V., and *T. biundularia*, Bork., with water-colour drawings of both larvæ from life, and remarked that after breeding both insects, he was perfectly convinced as to their being distinct species, although evidently closely allied. *T. crepuscularia* appeared from the last week in March to the middle of April, and

was always partly a double-brooded species; *T. biundularia* appeared early in May until the first week in June, and was only single-brooded; in every case the insect remained true to the parent type; and although the markings were somewhat alike in both species, yet there were characteristic differences as shown in the series exhibited; this also applied to the larval stages. Mr. Barrett and Mr. Tutt made some observations on this exhibit, the latter gentleman agreeing with Mr. Tugwell, but the former was of opinion that *crepuscularia* and *biundularia* were not distinct. Mr. Turner showed a very light form of *Nyssia hispidaria*, Fb., from Richmond. Mr. Carpenter also exhibited varieties of the same species. Mr. Fenn, a long series of *Larentia multistrigaria*, Haw. Messrs. Skinner, B. W. Adkin, and Mr. West exhibited Coleoptera, the latter gentleman a very interesting collection from the Colombian Republic. Messrs. E. Step, W. Manger, C. G. Barrett, Tugwell, Billups and others, also exhibited.—H. W. BARKER, *Hon. Sec.*

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*March 20th.*—J. A. Clark, F.E.S., in the chair. Mr. Quail exhibited a specimen of *D. galii*, Schiff., captured at Stoke Newington in July, 1888. Mr. Simes, a remarkably small *E. cardamines*, L., taken in Epping Forest, May, 1889. Mr. J. A. Clark, two varieties of *T. gothicina*, H.-S., the wings of one specimen, although having the markings of this species, strongly resemble *T. incerta*, Hufn., in shape. Mr. Whittle, a series of *Catoptria juliana*, Curt., and *Padisca oppressana*, Tr. Mr. Lewcock read a paper on behalf of Mr. Robert Gillo, of Bath, on the occurrence of aquatic Coleoptera at Burnham, Somerset, in September, 1889. It appeared therefrom that Mr. Gillo, by persistently working the district, day after day, had obtained forty-two species; included in this number were *Pelobius hermanni*, F.; *Halipilus mucronatus*, Steph.; *Hydrophilus piceus*, L.; *Dytiscus circumflexus*, F., and *D. punctulatus*, F.; in addition to these, he also found several species of *Elmis*, Latr., and *Parnus*, Fabr. Mr. Lewcock also read a paper on behalf of Mr. P. W. Jarvis, of Cape Town, on the "Coleopterous Fauna of South Africa." The number of species taken south of the Zambezi amount to upwards of 8000; Madagascar, having a distinct fauna of its own, is not included in the South-African list. The district appears to be very rich in Cicindelidæ, having about 50 species. The genera *Carabus* and *Pterostichus* are not represented, but in place of them are twelve species of *Anthia*, which are larger and far more powerful than our largest *Carabus* beetle, and twelve of the genus *Polyhermia*, which also are highly voracious insects; three species of the latter are so deeply pitted as to give the elytra the appearance of being perforated. A species of *Brachinus* found near Cape Town is three quarters of an inch in length, and the explosion emitted by it is in proportion to its size. Aquatic species are fairly represented; but Staphylinidæ are not quite so numerous as in Britain, although M. Fauvel has recently described fifty new species. Necrophagous beetles are not numerous, but several species of Histeridæ exceed three-quarters of an inch in length. Upwards of five hundred Lamellicornidæ are found. Some species of *Helioropris*

attain two inches in length; the genus *Onthophagus* (thirty species) contains many gaily-coloured beetles,—*O. rangifer* is of a brilliant ruby. The one hundred species of Buprestidæ are generally large in size. Elateridæ are not common. The genera *Telephorus* and *Malachius* are extensive, and most of the species common. The Tenebrionidæ, numbering over 400, inhabit the sandy veldt. Cantharidæ, some of which are prettily marked, find sixty-two representatives. South Africa also possesses a vast quantity of weevils, many of which are not found in other parts of the world. The *Longicornia* are much finer than the British insects, especially the Transvaal species. Chrysomelidæ are moderately common, some very showy. The genus *Donacia* is conspicuous by its absence. Cassidæ are large and numerous. The Hispidæ (twelve species) are very strange-looking creatures, being covered with spikes about two lines long. Mr. Jarvis also gave information respecting the best time for collecting, and the names of the coleopterists of Cape Town.

April 3rd.—The President in the chair. Mr. Raine exhibited a bred specimen of *P. rapæ*, L., without black tips to the wings. Mr. Clark, a series of *Rhodaria sanguinalis* from north of Ireland. Mr. Smith, a bred specimen of *A. atropos*, L., from Dartford. Mr. A. U. Battley read a paper on the entomology and geology of the London Basin. The discussion which followed was taken part in by Messrs. Clark, Cripps, Lewcock, and others.—G. A. LEWCOCK and E. HANES, *Hon. Secs.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*March 17th, 1890.*—The President, Mr. W. E. Blatch, in the chair.—Messrs. C. R. Parsons and H. R. Hodgkinson were elected members of the Society. Mr. R. C. Bradley showed *Asphalia flavicornis*, from Solihull, in one of which the stigmata had coalesced. Mr. H. M. Lee showed three *Hesperia*, apparently *lineola*, which he had found in a collection, and which he believed had been taken in Jersey. Mr. C. S. Wainwright showed a collection of insects from Columbia, S. America, including some fine *Morphos*, *Papilios*, *Heliconias*, &c. Mr. W. E. Blatch read a note on a new species of the family *Scydmaenina*, which he proposed to call *Neuraphes planifrons*. It was taken under bark of birch-stumps, in company with *Scydmaenus godarti* and *S. exilis*, at Sherwood Forest.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

REVIEWS.

Larva Collecting and Breeding: a Handbook to the Larvæ of the British Macro-Lepidoptera and their Food-plants, both in nature and confinement; with Authorities. By the Rev. J. SEYMOUR ST. JOHN, B.A. Pp. 165. London: Wesley & Son. 1890. Post 8vo.

FROM the title, it might be gathered that some hints on collecting and treating lepidopterous larvæ would be found in the work; but, as a fact, there is nothing of the kind, and the second part of the title alone would have sufficed.

Although it treats only of the Macro-Lepidoptera, the author of this little book deserves the thanks of British lepidopterists for the painstaking

way in which he has accumulated, prepared, and presented in handy form a large amount of interesting data concerning the larval food-plants of species occurring in this country. The book is divided into two parts. In the first, the larvæ are enumerated in classified order, and, where known, the food-plants upon which they feed are given. In the second part, the plants are arranged in accordance with the 'London Catalogue of British Plants,' 8th ed.; and the larvæ known to feed on each plant are mentioned. Reference to the work or works where the larva is described, or some observation on its economy recorded, enhances the value of this portion of the book; and it is to be regretted that in the first part, where it could have easily been done, no mention is made of the month or months in which each larva occurs.

For the benefit of those who may not be botanists, the common English names of the plants are added in both divisions, and an index to the second part provided. The lepidopterous genera of the first part are also included in this index. Altogether Mr. St. John is to be congratulated upon the production of a work which will certainly prove useful alike in the field or study.—R. S.

The Coleopterous Fauna of the Liverpool District. By JOHN W. ELLIS, M.B., F.E.S., &c. One vol. 8vo. Liverpool: Turner, Routledge & Co. 1889.

THIS is a reprint from the 'Proceedings' of the Liverpool Biological Society, vols. ii., iii. Unfortunately, the original pagination has been retained, the first part commencing on p. 182, and the second part on p. 46.

The area dealt with is "that portion of Lancashire and Cheshire falling within a circle having a radius of fifteen miles from the Liverpool Town Hall." The systematic arrangement is very nearly that of the 'Catalogue of British Coleoptera,' by the Rev. Canon Fowler and the Rev. A. Matthews. In compiling his list the author has been careful to produce something more than a mere enumeration of the species of Coleoptera occurring in the district. Where necessary, exact localities are given, frequently accompanied by observations on habits, &c.; the published records, entomological diaries of, and information otherwise conveyed by, local workers, together with his own special knowledge, are the sources from which such data have been obtained.

Altogether, about 80 per cent. of the British beetles appear to be found in the Liverpool district, the exact number being 990 species as against 3227 species of Fowler and Matthews's List. This number is divided among the several groups as follows:—Geodephaga, 163; Hydradephaga, 66; Palpicornia, 49; Brachyelytra, 250; Clavicornia, 156; Lamellicornia, 42; Serricornia, 50; Longicornia, 8; Monilicornia, 51; Heteromera, 81; Rynchophora, 124.—R. S.

OBITUARY.

JOSEPH S. BALY.—It is with regret we have to record the death of Mr. Joseph S. Baly, of Warwick. A notice of his entomological work will appear next month.

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[No. 325.]

ON THE OCCASIONAL ABUNDANCE OF CERTAIN SPECIES OF LEPIDOPTERA IN THE BRITISH ISLANDS.*

By R. ADKIN, F.E.S.

THE sporadic appearance in these Islands of certain species of Lepidoptera is a subject that has received a large amount of attention, and many theories have been advanced to account for the phenomenon: these may be grouped into two great classes, which may for present purposes be termed the "migration" and the "local causes" theories.

The British Islands, as we now know them, have a superficial area of some 121,000 square miles, and enjoy a temperate climate, but such favourable conditions were not always existent; at some former period this country was a land of snow and ice, probably not differing much from what Greenland now is, and the majority of our present species could not have lived under such climatic conditions: it is probable that at this time these Islands formed a portion of the continent of Europe, and that upon the glacial conditions giving way to a period of milder temperatures, a fauna suitable to the altered circumstances of climate would follow in due course. If we compare representatives of our more generally distributed species with those inhabiting Continental Europe, we find the majority of them are identical, and we arrive at the conclusion that they are of common origin. Further, the conviction is forced upon us that our present insect fauna has been derived from the Continent, and that it has been brought about by the several species gradually extending the area of their distribution. This would appear to indicate an initial migratory condition which it is easily conceivable would be subject to such modification as became necessary from time to time in the economy of a species; and the cutting off of the

* Abstract of a Paper read before the South London Entomological and Natural History Society, April 24, 1890.

British Islands from the mainland of Continental Europe cannot be regarded as imposing an obstacle that would not be easily overcome by migratory instincts thus engendered. If, however, the sphere of our observations is confined entirely to these Islands, we have great difficulty in detecting cases of probable immigration; for although the evidence may strongly favour migration, it may not be conclusive, and the circumstance might be referable to other causes. But if we find insects moving in numbers in situations where their presence cannot be accounted for in any other way, we may safely conclude that they are in a state of migration; the meeting with a swarm of *Deiopeia pulchella* in Mid-Atlantic is a case in point, and many other instances are on record referring to other species, and extending even to our shores. The reports furnished, through the courtesy of Mr. Cordeaux, by sundry Lighthouse keepers, although not numerous, are of great importance; those from Guernsey and Heligoland, referring to vast flights of *Plusia gamma*, *Hybernia defoliaria*, &c., passing frequently in a westerly direction, have a distinct bearing upon the subject.

On the other hand, there is the probability that the surroundings of a species during its metamorphoses would affect its subsequent abundance or scarcity: the evidence under this head is at best incomplete, but as far as it goes it is of importance. The females of many species deposit large numbers of ova, yet we do not find a corresponding annual increase in the number of the imagines of such species; their natural enemies hold them in check. If, therefore, we are to account for the cases of occasional abundance by purely local influences, we must find some irregularity in the working of Nature. It has been suggested that the insect may remain in one of its quiescent stages for an unusually prolonged period,—for instance as pupa, numerous cases are on record, but they tend to show that the second year is seldom exceeded, and in such cases as it is the number of emergences are proportionately smaller. But perhaps the most important of local causes is that of meteorological conditions: mild winters and cool summers are said to be detrimental to Lepidoptera, while hard winters and sunny summers are held to be favourable, and so forth; observation appears to prove that such is the case, but that the effect is upon Lepidoptera generally rather than upon a few species, and it is worthy of remark that some of the cases of greatest abundance of *Vanessa cardui* and *Plusia gamma* have occurred in cold wet seasons, when other species have been actually much less common than usual.

As examples of species exhibiting tendencies to occasional great abundance the following may be mentioned:—*Hybernia defoliaria*, *H. aurantiaria*, *Oporabia dilutata*, *Cheimatobia brumata*, *C. boreata*, and *Orgyia antiqua*. These all have apterous females,

the abundance is more often noted in the larval than in the perfect state, and the districts affected are generally of small area,—all facts tending to the probability of local influences being the immediate cause; but we must not overlook the report from Heligoland Lighthouse, which distinctly mentions large flights of *H. defoliaria*, &c. It must not be supposed that these would include the wingless females; but it is far from improbable that the arrival of numbers of the opposite sex would materially affect the status of the species here, and possibly become a factor in the occasional abundance of the larva. *Pieris brassicæ* has been observed moving in immense numbers, both at sea and on our coasts, and the migratory swarms of *Vanessa cardui* that passed through many parts of Continental Europe in 1879 were the forerunners of an abundance of the species in this country in the same year. *Colias edusa*, *Acherontia atropos*, *Sphinx convolvuli*, *Deilephila galii*, and *Plusia gamma*, also furnish a considerable amount of evidence, which, however incomplete it may be, tends to the conclusion that immigration is a chief factor in the causes of great abundance occasionally observed, and in some instances the direct and only cause.

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CHALCOPHORA IN THE SCRUBS OF CENTRAL QUEENSLAND.

BY GEO. BARNARD.

ONE hot day in January, the thermometer at 94° in the shade, we—that is, I and my sons—determined to have an entomological hunt for some of the fine *Chalcophora* inhabiting the scrubs in our neighbourhood. A hot bright day, though unpleasantly warm for us, was just the time for the sun-loving beetles, to be showing in abundance. We started, therefore, in anticipation of a good day's sport, and, as the sequel will show, we were not disappointed. A walk of little over a mile brought us to the edge of a large scrub, fringed by what is commonly called oak, a species of *Casurina*. This was the feeding-ground of *Chalcophora vittata*, which eats the leaves of the oak. A heavy thud with a tomahawk jars the tree, and causes any *vittata* to fly off with a loud buzz, and if it flies low,—which it generally does at the first drop,—being a heavy flyer it is speedily netted. Many escape by flying too high, the bushes always hindering more or less and making it heavy work; so after catching about a dozen we decided to move on and look for *C. ajax*, one of the finest of our Chalcophoræ. This insect feeds on the leaves of a broad-leaved species of *Eucalyptus*,—a heavy gnarled tree, putting one in mind of the grand old oaks at home. These trees are scattered singly in the

dense parts of the scrub, and the close heat made forcing our way through very tiring work.

On our way we flushed some "Wonga-wonga" pigeons, and presently put up a pair of green-winged pigeons (*Chalcophaps chrysochlora*), and a little further on some wallaby (a small species of kangaroo which only lives in the scrubs), were sitting up viewing us very suspiciously. The boys began regretting leaving their guns at home, and I had to remind them that we were looking for insects, not birds or animals.

Having found a likely tree, the next question was how to get at *ajax*, which would be found feeding on the topmost leaves. This was speedily solved by the boys taking off their boots, and with a tomahawk cutting notches in the bark, by which they easily ascended the butt of the tree, black-fellow fashion, hauling up the net afterwards and proceeding to business. When seen on the leaf, the net is gently placed underneath; a slight upward movement and the beetle drops quietly in, and is then transferred to a small box, each being kept separate on account of a yellow pollen matter covering the wings, which if rubbed off takes away a great deal of the beauty of the insect. After getting some two dozen, and the sun reminding it was time to look after the inner man, we made for a water-hole, where we proceeded to eat our lunch and discuss the probability of finding *C. superba* on our way home. Finishing our repast, we endeavoured to pass half an hour away in resting, not, as my readers may suppose, enjoying the "Dolce far niente" in the tropical shade, but trying to imagine we were getting a little cooler by keeping quiet, the perspiration meanwhile standing out in beads on our faces and hands, and a few mosquitoes gently intimating that it was not the time to sleep,—so to work again and forward. Not far off, a tree commonly called a "mess-mate" appeared in full bloom, the flowers, in clusters, much resembling those of the *Eucalyptus*. This was a prize, for here was the haunt of the flower-loving Buprestidæ. The tree was soon scaled, and an exclamation of delight escaped one of the boys as he extracted from his net a large lovely *Stigmodera* (since found to be new), closely resembling *S. similis*, about an inch and a half in length, straw-coloured, with lower part of elytra and thorax metallic-blue. This was the great find of the day. Five specimens were taken, besides some seven other species of *Stigmodera*, all small and mostly known to us, besides a host of smaller beetles, but no Lepidoptera, which was rather surprising considering the apparently favourable season. Pretty well satisfied so far, and the day wearing on, we retraced our steps, making for a patch of "lance-wood" that lay on our way home. Soon after reaching this patch a large *C. superba* was espied walking down a tree (a peculiarity they have), a splendid fellow! the golden green lines glistening in the

sun, and his large eyes—seemingly endowed with reason—intently watching us. Cautiously we approached, net in hand, preparing to strike, but he was not to be had. As we drew near he began to move round the tree, always keeping us at the same distance, and moving upwards, until with a rush we tried to secure him, only to see him fly off to the top of another tree, safe in his glory for the time being, and leaving us lamenting his non-capture. This is about the most difficult Buprestid to secure, for, though of large size, it is as nimble as a mouse, and really like that animal in its movements. A dull day is best for them, as they are then more lethargic. However, to return, after spending a considerable time and meeting with many disappointments, we got seven amongst us,—not bad, considering all things. By this time the sun was low, and we were still some distance from home. We had wanted to go through some trees near the edge of the scrub, where *quadrisignata* is usually to be found, but it was getting late, and these insects as well as persons go to bed, the former generally before sunset, so there was not much chance of getting any, still we determined to have a try. The wallaby were now on the move, going, like ourselves, towards the edge of the scrub where they feed at night, and other tokens gave warning that the tropical night would soon be on us. Hastening on, we came to the trees in question, but almost too late. However, by dint of hammering on the butts (they were only trees of six or eight inches through), a few *quadrisignata* were dislodged and easily secured, as they dropt almost to the ground. Completely wearied we now made for home, where we arrived hot, tired, and dirty, but not altogether dissatisfied with our day's work.

So ended one of my many rambles in the Queensland Bush for the purpose of collecting all kinds of Nature's specimens. Their arrangement and keeping has given me many a pleasant hour, especially when, in a time of drought and threatened ruin, one's spirits were inclined to go below zero.

Should anyone from the "Old Country" be tempted to pay me a zoological visit, we, or rather my boys (I am getting too old), would be only too happy to put him through his facings and make the Bush as interesting as they could.

Coomooboolaroc, Duaringa, Queensland, Feb. 25, 1890.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

III. — METHOD OF WORKING.

The first consideration was to ensure *absolute uniformity* in my experiments, in order that they might all be strictly comparable *inter se*. Now it seemed very evident that the effect of

reagents on the colours might well be a function, partly, of the duration of action. After a few preliminary trials, I determined to leave the colours under the action of the reagents for *one hour*, in every case. (I may add, however, that in all the cases where the most striking results were obtained, the action was very rapid, or often instantaneous; nevertheless, the time effect was apparent in many cases, and, anyhow, the safeguard was there.)

The various colours required were cut out from the wing, placed in watch-glasses and *covered* by the reagent, being left thus exposed—as already stated—for one hour. But at the very outset I was encountered by a difficulty here: “Like water off a duck’s back” is an ancient proverb, and exactly describes the way in which the liquids gathered up in spherules and rolled off the scaled wings; in fact it was impossible to wet these; and it immediately struck me how very stupid I had been in not expecting this certain result. The question then arose, how to overcome this difficulty. One obvious solution was to first touch the wing with alcohol, which of course soaks it thoroughly, and so enables watery solutions to wet it; but I was unwilling to use alcohol, except as a last resort; (for that would necessitate a complete set of blank experiments with alcohol alone; and should it be found of itself to act in any cases, the problem would become complicated). After a little consideration, I determined to try gumming the bits of wings on to a watch-glass. This answered admirably,—at least when I left them some hours to dry in; but if the reagents be applied too soon, some of the wings become detached, and swim about half-dry on the surface in the most intolerably exacerbating manner;—a “superfluity of naughtiness” on their part scarcely conducive to sweetness of temper on the experimenter’s.

It will be understood, then, that these wings were *not* merely wetted by the various reagents and then *left*, but were actually *submerged* in the reagent for *one hour*.

Recording the results.—Here I encountered another difficulty; one, too, which cannot be said to have been really overcome at all,—and this is the want of a colour standard. The natural colours of the wing are themselves not always easy to describe accurately and *uniformly*; some, of course, may be disposed of at once, as blue, yellow, green, and so on; but in very many cases it is very difficult to decide whether a colour shall be designated yellow or orange; brown, chestnut, or chocolate; and so on. As concerns this, however, I have been to great extent guided by the results, and—as will be seen—have not scrupled to divide certain colours (in what may at first sight seem a somewhat arbitrary manner) from certain others that *look* almost identical, but really are found to have a different constitution. As an example, I may refer to tabulations to be given hereafter, where the colours of

L. quercus, *M. oleracea*, *O. antiqua*, &c., are all classed as brown, in distinction to chestnut, which not only includes—naturally—the colours of *Epinephele tithonus*, *Cœnonympha pamphilus*, and *Argynnis*, but also such apparently un-chestnut colours as *L. phlœas* and *V. urticæ*. The behaviour of these colours, under the influence of various reagents, demonstrates, nevertheless, that they are essentially the same as the colour of *E. tithonus*, which seems most accurately described as chestnut. So, too, it seems best to class the pink of *Smerinthus* and the ambiguous purplish reddish of *Xanthia* with the reds, since their behaviour is the same. Unfortunately, however, I am compelled to class together, under one name, all greens, although there are several differently constituted colours here, but all apparently green. Exactly a parallel case is found among the yellows; but I had no choice in such cases, since it is impossible to call a pronounced yellow or green by any other name.

By far the gravest part of this difficulty lay, however, in naming the *changed* colours. Everyone can satisfy himself at once, by a glance at his cabinet, what colour I intend when referring to the natural colour; but the only conception possible to him of the colour-change produced in my experiments must derive from my description, and I found it a very serious difficulty to name these changes with anything like clearness, distinction, accuracy, and *uniformity*. It will be readily understood that when a colour, say red (not in itself a very distinct name to start with), treated by a dozen different reagents, undergoes several different degrees of change,—each of which suggests at the moment some description, such as “reddish orange,” “orange-red,” “faded red,” “orange,” “deep yellow,” “lemon-yellow,” “pale flesh,” and so on; and then several weeks later a more or less similar red is found to change in more or less similar ways,—it is exceedingly difficult to preserve anything like uniformity in the description of the colours produced. In fact, without some kind of tintometer or colorimeter, applicable in such work, all such names must be looked upon as more or less “fluid” and approximate. Without doubt, I have on one occasion described a new colour as deep flesh, and on another as reddish orange, and so on, in numberless instances. Too rigid interpretation of the colour-names would be, therefore, inaccurate; but, nevertheless, I hope that these are sufficiently descriptive and uniform to make all my results intelligible and available. I think that the difficulty will be quickly appreciated by anyone who may try to name a few score of even natural colours uniformly, without any standard.

Reagents used.—This is a chronicle of disappointments. No one, who had not learned by experience, would imagine how stubborn and callous to powerful reagents are many—as one

would suppose unstable and delicate—insect colours; neither would he be prepared for the dolorous monotony in the changes produced by most dissimilar reagents,—when they have any effect at all. At starting, I divided my reagents into several different classes, *viz.*, “mineral acids, organic acids, alkalis, various salts, and various organic reagents,” the last two classes being of a somewhat heterogeneous character. This division turns out to be all nonsense: there are (so far as my experience goes) only two classes of reagents, *viz.*, those that destroy or alter the colours, and those that have little or no effect; and the majority belong to the latter class. I had started off with great enthusiasm, experimenting with about two dozen different reagents, and tabulating my results on separate sheets, drawn up for “mineral acid” reagents, “alkalis,” &c., respectively; but, wise from experience, I propose in future to work with only half a dozen reagents, such as have proved serviceable already.

I will now give a list of the various reagents that have been tested, first making one or two preliminary explanations for the benefit of any non-chemical readers who may possibly not understand entirely some of the expressions used. The acids (and ammonia) described as “strong,” are such as are customarily supplied for laboratory use; a 50 per cent. acid, is one of these diluted with its own bulk of water, and so on; a 50, 25, 10 per cent. solution of any salt, &c., implies that 100 cubic centimetres of the solution contain 50, 25, 10 grammes of the salt.* (In the case of the caustic hydrate solutions used, this is not strictly accurate, since in making up these the ordinary “stick” caustic was employed, and this contains a percentage of water. This fact is, however, of no importance, so long as *uniform* solutions are always used.) Many acids are solid at the ordinary temperatures, and therefore they were dissolved in water, like salts, and made up to various per cent solutions. In some instances, *saturated* solutions were made; that is, of course, as much was dissolved as the water could take up. In only two or three cases, by careless oversight, were my reagents unquantitative; but, except in one instance, such reagents were, fortunately, unimportant. All the *solutions* are aqueous, unless expressly stated otherwise.

I. † Sulphuric acid.	40 per cent. (?)
Nitric acid.	50 per cent.
‡ Hydrochloric acid.	Strong.
Hydriodic acid.	Solution of S. G., 1.500.
Phosphoric acid.	25 per cent.
Hydrofluosilicic acid.....	The usual analytical solution.
Boric acid.	Saturated alcoholic solution.

* In the metric system, 1 gramme is the weight of one cubic centimetre of distilled water at standard temperature and pressure.

† I very stupidly omitted to note the strength of this reagent.

‡ Popularly known as muriatic acid.

II. Acetic acid.....	Strong.
Oxalic acid.....	Saturated solution.
Tartaric acid.....	25 per cent. solution.
Gallic acid.....	Saturated alcoholic solution.
III. Ammonia.....	Strong (<i>i. e.</i> , the usual solution of the gas).
* Sodic hydrate.....	25 per cent.
Ditto	10 per cent.
† Potassic hydrate.....	25 per cent.
Ditto	5 per cent.
IV. † Phenol.....	50 per cent. alcoholic solution.
§ Trinitrophenol.....	Saturated solution.
Tannin.....	(Strength of solution unknown.)
V. Potassic cyanide.....	Strong solution; exact strength not known.
Argentie nitrate.....	25 per cent. solution in 50 per cent. alcohol.
Potassic permanganate.....	About 7 or 8 per cent., probably.
Potassic dichromate.....	} Abandoned very quickly, as being quite useless.
Potassic iodide.....	
Potassic ferro-cyanide.....	

I might add that, having originally delusively anticipated the most important results from the organic acids, I had proposed to use various others of these, such as succinic, malic, citric, benzoic, lactic, formic, &c.; but finding quickly how useless the organic acids were, I relinquished this intention.

Now, regarding the action of these various reagents, the first thing to note is that most of them are either useless or superfluous. Beginning at the bottom of the list, the salts are either quite without action, or—*e. g.*, potassic cyanide—very feebly imitative of stronger reagents, and therefore wholly superfluous. A peculiar effect produced on one or two colours by a strong solution of argentic nitrate will be referred to subsequently. In the next class (IV.), I had hoped to find some striking results; but the action, where any occurred, was simply feebly imitative again, and so superfluous. Among the *alkalis*, ammonia was somewhat disappointing. I had expected it to be by far the most active reagent of the set, but it proved often less efficacious than the others. The action of *all* these five reagents was the same, and therefore several of them are evidently superfluous. But the most surprising result was that (with, I think, one exception) the action of these alkalis was *identical with that of the acids*. By this, I do not mean that the same colour in the same insect was always affected equally by acid and by alkali, but that whenever any action followed it was always the same, and differed,

* Caustic soda.

† "Carbolic acid."

† Caustic potash.

§ "Picric acid."

if at all, only in degree or rapidity. Some colours are instantly and completely altered by certain acids, and only slightly or slowly by the alkalis (e. g., *Zygæna* and *Euchelia*, reds). In other cases, both classes of reagents are about equally efficacious (e. g., *urticæ*, chestnut); and in others, again, the alkalis are the most efficacious (e. g., the chestnut of *tithonus* and *C. pamphilus*). But the noteworthy point is that in (almost) no case does an alkali produce one result and an acid a different result; the action (when not *nil*) is uniformly *destructive*, producing a retrogressive colour. This appears to me a somewhat significant phenomenon, and I shall have occasion to allude to it later, when discussing the bearing of my results on the subject of natural variations. This similarity of action is somewhat surprising, from a chemical point of view. As I have already said, the similarity of action of the organic and the mineral acids was a disappointment to me; but still it is not at all surprising, for, comparing their action on vegetable colours, of course litmus is turned red by acetic acid, &c.,* as well as by the mineral acids; but that alkalis, which affect litmus, &c., diametrically oppositely to acids, should have the same effect on insect colours, is an unlooked-for result. As to the next class—of organic acids—I have already said sufficient. They are wholly useless or else superfluous; their action, when not *nil*, being simply the same as that of weak mineral acids. Lastly (or firstly!), as concerns the mineral acids, the most valuable is hydrochloric. It is simply an invaluable reagent,† and many colours are changed by it instantly. Next in value to it, is probably the diluted nitric acid. Sulphuric is rather peculiar and erratic in its behaviour sometimes; in some cases it seems to fail in getting at the colours, as it were. The 25 per cent. phosphoric acid has a feeble action, comparable with that of acetic; and the hydrofluosilicic is about the same. Boric acid is useless, or feeble. Hydriodic is also of no service; it affects some colours somewhat feebly, but with some *whites* produces apparently startling results by dying them a deep brown or purple; this, however, is of course in no way comparable with the results that we are here concerned with, and may at once be put aside.‡ It might, however, be interesting to reinvestigate the behaviour of all the white *Lepidoptera* when tested with either hydriodic acid or a solution of iodine, since possibly some differences of constitution might thus be detected; and I therefore intend taking an early opportunity of looking into this.§

After this *resumé*, it will hardly be denied that, as I said, the

* Not exactly the same red, however; but that is immaterial in this relation.

† There is a very peculiar *after*-phenomenon, which I must describe later, connected with the action of hydrochloric and several other acids on red colours.

‡ *Gonepteryx rhamni* was stained a magnificent purple by this reagent.

§ Since this was written the investigation referred to has been made, and the details will therefore be given in their proper connection next month.

majority of my reagents were eminently disappointing, and my original expectations altogether too jubilant. It is only by experience, however, that one can learn; and, acting on mine, I propose in my future researches to limit the number of reagents very materially. It may, perhaps, be convenient to group those that I have found of real use, stating them in order of merit, as near as may be:—

Hydrochloric acid.	Ammonia.
(Nitric acid (50 per cent.)	Sulphuric acid (25 or 50 per
(Potassic hydrate (25 per cent.)	cent.)
10 per cent. potassic hydrate.	

(To be continued.)

NEW SPECIES OF RHOPALOCERA FROM CHINA.

By J. H. LEECH, B.A., F.L.S., &c.

THE following species are, I believe, new to Science, and were obtained last year by my collectors Messrs. Pratt and Kircheldorff, in the province of Setchuen, North-west China.

EREBIA RURICOLA, sp. n.

♂. Dark brown: central area of primaries blackish, outer third paler; a large black spot with two white pupils and faintly encircled with pale brown towards apex: there is often a white dot towards anal angle of secondaries. Under surface grey-brown: on primaries the ocellus of upper surface is reproduced, and is ringed with pale fulvous; below it is a smaller ocellus, and there is sometimes a still smaller one between them, placed on the edge of the former; below apex there is a reddish brown cloud, and there are indications of a band of the same colour between large ocellus and discal cell: the secondaries are traversed by reddish brown lines, the most conspicuous being two broad ones from middle of costa which terminate just before median nervure, and one from middle of abdominal margin to outer margin; there is a submarginal series of white dots; the outer margin and centre of the wing are also dashed with white. Expanse, 58 mm.

Four specimens taken at Ta-Chien-Lu, and two at Wa-Shan, in July.

Nearly allied to *E. saxicola*, Oberth. (Etud. d'Ent. ii. p. 32, pl. iv. fig. 1), but the white pupils of apical ocellus are placed more directly one under the other; the antennæ are pale brown, and the clubs are black beneath. On the under surface the colour of primaries is different, and there is an additional ocellus towards outer angle; the markings are more distinctly defined on the secondaries.

EREBIA RURIGENA, sp. n.

♂. Dark brown, with a slight yellowish tinge in certain lights. Primaries have a blackish cloud-like fascia from inner margin to centre of the wing; the ocellus towards apex is large, conspicuously ringed with pale

fulvous, and the lower of the two white pupils is very faint or entirely absent. Under surface brown, dusted with ochreous along costal half of primaries; the ocellus is brighter than above, both pupils are well defined, and it is followed by a reddish brown cloud extending nearly to first median nervule: secondaries ochreous-grey, clouded and dusted with darker scales, and traversed by a number of wavy brown lines, the most distinct of which are the two central and the submarginal; preceding the submarginal line is a series of white points. Fringes pale grey-brown. Expanse, 62 mm.

Several males taken at Ta-Chien-Lu, and three at Wa-Shan, in July.

Allied to *E. ruricola*, but distinguished at once by the fulvous ring of ocellus. In some specimens there is no trace of white points before submarginal line on under surface of secondaries; in others the central lines assume band-like proportions, and the submarginal line is not clearly defined.

PARARGE PRÆUSTA, sp. n.

♂. Fuliginous-brown. An angulated and interrupted fulvous band traverses the primaries from costa to outer angle; towards apex are two paler fulvous spots with a black one below them. Fringes whitish, chequered with black at extremities of nervules. Under surface:—Discal area of primaries reddish brown; fascia as above, but broader and paler; apical spots white, the black one below them is distinctly ringed with pale fulvous and has a white central dot: secondaries greyish, with some marks near the base and two transverse angulated central lines reddish brown; there is a submarginal series of six ocelli,—that on the costa is the largest and is preceded by a whitish crescent, the third is the least of the series, and the sixth has two white pupils.

♀. The fascia is broader, there is a fulvous flush in the submedian and second median interspaces, and the fringes are pale fulvous but chequered with black, as in the male; the black apical spot has a white centre. Expanse, ♂ 58 mm., ♀ 62 mm.

A very fine series, including both sexes, taken at Wa-Shan in June, and one female specimen from Huang-mu-Chung.

Closely allied to *P. episcopalis*, Oberthf. (Etud. d'Ent. xi. p. 22, pl. iv. fig. 24), but the fascia on primaries is more angulated, and fulvous instead of white. The apical spots of *P. episcopalis*, when present, are white and very small. On the under surface of primaries the points of difference are as well defined as above, but colour and markings of secondaries appear to be almost exactly alike in both species.

ARGYNNIS ZENOBIA, sp. n.

♂. Fulvous with black markings, as in *A. childreni*, Gray, but the outer margin of secondaries is without the bluish tinge of that species, and the sinuses are not nearly so deep. On the under surface of primaries there is not the least tinge of red of any shade; the silvery lines at apex are sinuate and enclose three black spots, the upper one more distinct than the other two: on the secondaries there is more blue in the composition of the greenish ground colour; the basal and discal lines are very similar to these characters in *A. childreni*; the central band is sinuous and interrupted at the end of cell, where there is a large black dot; marginal and submarginal silvery lines are more indented, and towards costa the opposing angles of these lines meet

and form rings; before submarginal line is a series of black spots, each with a centre slightly paler than ground colour.

♀. Rather paler than the male; base of inner margin of all the wings suffused with greenish; there are some spots and a transverse line terminating in a large subquadrate spot in cell of secondaries.

Antennae of the male brown, club black with fulvous apex; of the female, as in same sex of *A. childreni*. Expanse, ♂ 84 mm., ♀ 87 mm.

Two specimens of each sex, Ta-Chien-Lu, in July.

In size and in the ground colour of upper surface this species closely resembles my specimens of *A. childreni* from N.W. India, but they are much smaller and paler than specimens I have from N.W. China; these last measure, ♂ 94 mm., ♀ 110 mm.

GRAPTA GIGANTEA, sp. n.

♀. Primaries fulvous, thickly sprinkled with black scales at the base; costal margin spotted with black and yellow; discal and costal black markings arranged as in *G. c-album*, but larger; external margin broadly black, intersected by two fulvous wavy transverse lines. Secondaries fulvous, thickly dusted with black scales at the base and lower half of the wing; below a large black patch on the disc is a blackish cloud extending to abdominal fold, and beyond is a broad black transverse band, the outer edge of which forms a series of points on the nervules: external margin broadly black, intersected by two fulvous lines as in primaries. Under surface ochreous-brown, marbled with pale violet-brown, and intersected by indistinct black lines; before the external margin of all the wings are two dentated black lines,—these are interrupted by the nervules, and the space between them is leaden grey; preceding these lines, on the primaries, is a series of eight dots, the third seventh and eighth with pale centres; on the disc of primaries is a silvery white spot placed on the third median nervule; the silvery white mark on secondaries is large, and in shape represents three sides of a square. Expanse, 72 mm.

One female example taken at Ta-Chien-Lu, in July, at an elevation of 7500 feet.

This species is allied to *G. c-album*, Linn., but it is much larger, and the margins are more decidedly indented. The mark on under surface of secondaries is very like the same character in some of my specimens of *G. c-album* from Japan, but in the marbling of the under surface of all the wings *G. gigantea* more nearly resembles *V. charonia*, and it also agrees with that species in having a white spot on under surface of primaries,—a character not usual in the *Vanessidæ*.

HELCYRA SUPERBA, sp. n.

Closely allied to *H. hemina*, Hewitson, but it differs from that species in the position and size of the black markings on upper surface. Nearly the whole of the apical half of the primaries is black, and this has its inner edge more deeply indented; the discal spots are two in number, but the larger is broadly linear. On the secondaries there are eight black spots, arranged one below the other in a transverse series; the second of these is the largest, and the first, third, fifth and sixth are often faint and sometimes entirely eliminated: the submarginal line is broad and dentate throughout from costa to anal angle. Fringes white, preceded by a narrow fuliginous grey line. Under surface shining white, apical and discal markings of primaries

faintly showing through from above: on the secondaries is a transverse series of black lunules; those in the first subcostal and second median interspaces are followed by black spots edged internally with orange. Expanse, ♂ 82—90 mm., ♀ 92—98 mm.

A splendid series taken at Chia-Kou-Ho, in July.

In a few examples there is, on the under surface of primaries, an orange-bordered black spot in the second median interspace.

SEPHISA PRINCEPS, ♀.

Apatura princeps, Fxsn. Rom. sur Lep. iii. p. 289, pl. xiii. fig. 7 a, b (1887).

Apatura cauta, Leech, Proc. Zool. Soc. 1887 (p. 417, pl. xxxv., fig. 2).

The female agrees with the male, but the wings are rather more ample. This sex has not been previously mentioned.

Among the specimens of this species lately received by me are three female examples from Chang-Yang which have nearly all the fulvous markings of the male replaced by white; the only spots of the typical colour are the two in discal cell of primaries and one on costa of secondaries, whilst below the median nervure of primaries there is a bluish longitudinal streak instead of a fulvous one. In size, shape, number, and position of the spots and dashes, this form agrees exactly with the female type, and, as the difference is one of colour only, I propose the name of *albimacula* for this variety.

APATURA PALLAS, sp. n.

♂. Blackish brown, with black, white, and pale fulvous markings. Primaries thickly sprinkled with fulvous scales on basal third, beyond which is a transverse series of four fulvous spots preceded by an irregular black band, the spot nearest the costa is darker than the others, and is followed by a large triangular black spot; there are three fulvous spots at outer extremity of discal cell, and below these a fulvous spot in each median interspace,—that in the first has a whitish centre, the other is preceded by a round black spot, before the apex there are two whitish spots (the upper one is round), the spots forming the submarginal series are fulvous, but not well defined towards costa. Secondaries:—Basal half clothed with silky grey-brown hairs, and limited by a fulvous transverse interrupted band; the inner portion of this band becomes indistinct after passing the second median nervule, but the outer, though most broken up, is continued to the first median nervule, enclosing a well-defined black spot in nervular interspace; a black band, broad towards costa and tapering to anal angle, precedes a fulvous submarginal band which is intersected by the nervules, as also is a broad fulvous line on outer margin. Fringes white between the nervules. Under surface pale olive-green; the markings of primaries are as above, but the fulvous gives place to white or whitish, and the black spot in second median interspace is encircled with fulvous: secondaries pale olive-green; basal area washed with greyish, and bounded by an olive-brown transverse tapering band; from the inner edge of this band, which is broadly bordered with silvery white, a spur runs inwards and upwards above the median nervure; there is a well-defined ocellus on the second median interspace, and above it is a series of silvery white spots, the interrupted submarginal band is of the same colour, as also a fainter line which traverses the pale olive-brown outer margin. Expanse, 39 mm.

One male specimen taken at Chia-Kou-Ho, in July, at an elevation of 1700 feet.

On the upper surface this species is not unlike *A. iris* var. *bieti*, Oberth. (Etud. d'Ent. xi. p. 18, pl. iii. fig. 15), but the fulvous spots are much paler, and the black spot on primaries is not ocellated and is less conspicuous; the fascia on secondaries is narrower, and has the inner edge curved, and there is no purple reflection on these wings. On the under surface *A. pallas* is quite unlike any species of the genus with which I am acquainted, but bears a superficial resemblance to *Argynnis paphia*.

THECLA CAELESTIS, sp. n.

♂. Bright blue. Primaries with broad black band on outer margins, the apical portion extending nearly to middle of the costa; from this point to the base the costa is edged with black. Secondaries:—Two black spots just above anal angle (one on each side of submedian nervure); the ante marginal band is black and fairly broad at apex, and this colour is continued half-way up the whitish abdominal margin. Fringes greyish, preceded by a black line on the secondaries; tail black, tipped with white. Under surface russet-brown; on the primaries there is an indistinct discal spot, and beyond it an oblique silvery white line extending from costa to first median branch; submarginal line bluish white, ill-defined towards apex, and edged internally with black towards the inner margin, which is broadly grey; secondaries have a silvery white central transverse line and a bluish white sinuous submarginal line; the latter is edged internally with blackish, and the former is twice angulated above the anal angle and terminates about the middle of abdominal margin; anal angle is black, and above it is a broad orange-red patch extending from first median nervule to end of central line on abdominal margin; the black spots are reproduced, but that nearest the anal angle has a blue centre; fringes as above, but the black line at their base is preceded by a bluish one towards anal angle.

♀. Similar to the male, but the black band of primaries is much broader, and contains an orange patch, which is bisected by the second median nervule; the costa and fringes are tinged with fulvous; the marginal band of secondaries is also broader. Expanse, 42 mm.

A very fine series taken at Ta-Chien-Lu, in July.

In the male the marginal band of secondaries varies in width; in some specimens it is only represented by the costal portion. One example has this band broader than the female, whilst the black on primaries is of the same width as in the female.

APORIA PROCRIS, sp. n.

♀. Yellowish white, with the neuration black and conspicuous; submarginal line of primaries dentate, extending to first median nervule: on the secondaries there are indications of bifurcated streaks between the nervules. Under surface of primaries whitish, costa and apex yellowish; secondaries yellow, with a patch of orange at base; neuration and lines as above. Expanse, 25 m.m.

One example, Ta-Chien-Lu, in July.

Allied to *A. saracta*, Moore, but differs therefrom in colour and in the absence of black patch beyond discal cell. It is perhaps most readily distinguished by the black neuration.

PIERIS LOTIS, sp. n.

Black with white markings; these on the primaries are very similar to *P. larraldei* (Oberth. Etud. d'Entom. ii. p. 19, pl. 1, fig. 2 a, b); the basal two-thirds of secondaries are white, with a broad patch of black scales at the base and extending along the median nervure; there are no white or whitish submarginal spots on either primaries or secondaries, but the latter have a series of more or less lunulated spots on the outer margin. Under surface of primaries also similar to *P. larraldei* as regards the white markings, but the costa and apical third are pale yellowish; the latter is intersected by the black nervules and some thin black bifurcated streaks between them; secondaries are pale yellowish; neuration black, a bifurcated black streak in each nervular interspace. As in the same sex of *P. larraldei*, the female has the white markings suffused with greenish yellow. Expanse, ♂ 74 mm., ♀ 78 mm.

Four male specimens taken in a marsh near Wa-shan, June; and two examples of each sex, Ta-Chien-Lu, July.

PIERIS CISSEIS, sp. n.

♂. White; apex of primaries broadly black; at the outer extremity of discal cell is an elongate black spot, and towards external margin of the wing are two black spots,—the upper one is the largest, and is connected by some scattered black scales with the apical bands. Under surface:—The black spots of primaries are reproduced, but the apex and costa are yellowish; secondaries clear pale yellow. Expanse, 76 mm.

One specimen taken by a native collector at Chang-Yang.

This species resembles the female of *P. brassicae*, but the black discal spot at once distinguishes it. The secondaries are without darker scales on the under surface.

PAPILIO SCIRON, sp. n.

♂. Velvety brownish black, base of primaries sprinkled with yellowish scales, markings of all the wings bright orange-yellow; these on primaries comprise a broad central fascia, a blotch on costa at the extremity of cell, a central row of four spots, and a submarginal series of spots; the secondaries have a central fascia and submarginal row of spots, margins of anal angle tinged with chestnut, and above it is a short streak of bluish grey scales.

♀. Agrees with male, but the markings are rather paler. Under surface:—Basal third of all the wings rich chocolate-brown, central third yellowish white, and outer third fuscous with paler interrupted submarginal band; there is a patch of chocolate-brown at the extremity of discal cell on all the wings, and one at anal angle of secondaries. Expanse, ♂ 102 mm., ♀ 116 mm.

Four specimens of each sex from Chia-Kou-Ho, July; two from Huang-mu-Chung, August.

Allied to *P. gyas*, Westw., from Sikkim (Arc. Ent. i. pl. 11, fig. 1, 1841).

DESCRIPTIONS OF NEW SPECIES OF PHYTOPHAGOUS
COLEOPTERA RECEIVED BY MR. J. H. LEECH, FROM
CHANG-YANG, CHINA.

By MARTIN JACOBY, F.E.S.

(Continued from p. 167.)

CNEORANE RUFIPES, *Weise*. (Pl. II., fig. 11.)

Numerous specimens answering to the description given by the author were obtained, all differing from *C. elegans*, Baly, by the entirely rufous legs. So many closely allied species of *Cneorane* have lately been described by Fairmaire and Allard, that it is almost impossible to determine any species with certainty without comparing the types; and there can be little doubt that many of them are either identical or varieties, as the insects seem subject to great variation in size, sculpture, and colour. It is to be regretted that new species are continually described without consulting specialists as to their opinion of their specific distinction, since short descriptions can give but little assistance in the determination of these closely-allied forms. *C. de la touchi*, Fairm., seems certainly identical with *C. femoralis*, Jac.

EUSTETHA NIGROPUNCTATA, *Fairm.* (Pl. II., fig. 4.)

I must refer, although somewhat doubtfully, the specimens obtained by Mr. Pratt to this species. Fairmaire seems to have forgotten to mention the colour of the elytra and of the abdomen, which is flavous; the former have five black spots each,—one at the shoulder, two placed transversely near the middle and of small size, and two larger ones (one before, the other at the extreme apex). It is obvious that the elytra cannot be black (according to the description) with black spots, but curious that the colour of the abdomen should have been overlooked as well by the author. I think in regard to this genus, that it might very well be united with *Galerucida*, with which it has all structural characters in common; this is also the opinion of Herr Weise.

EUSTETHA THORACICA, *Jac.*

Of this species a few specimens were obtained, which differ from the type in having an unspotted thorax, but in no other way; these specimens all belong to the fulvous variety, the type having dark bluish elytra. *E. thoracica* has an entirely smooth and impunctate thorax.

SPHNENORAIA CUPREATA, n. sp.

Below fulvo-piceous, above metallic dark cupreous; thorax sparingly punctured, with a deep depression at each side; elytra finely punctured, semipunctate-striate; abdomen obscure fulvous. Length, $1\frac{1}{2}$ —2 lines.

Ovate, slightly widened posteriorly; head impunctate, with a deep fovea between the eyes; antennæ about half the length of the body, the second and third joints very small and equal, the intermediate ones compressed. Thorax twice as broad as long, the sides nearly straight, the anterior angles thickened and prominent, the surface with a deep but short transverse depression at each side, finely and sparingly punctured; elytra with a longitudinal groove within the shoulders, as finely punctured as the thorax, except within the humeral depression, where the punctures are stronger, the punctuation arranged in rather regular rows; abdomen more or less fulvous.

This species resembles somewhat *S. fulgida*, Redt., in its metallic cupreous colour, but is very much smaller, and is distinct by the fine punctuation of the thorax and the elytra; the colour of the upper side is a dull reddish cupreous, that of the head is more bluish.

Two specimens.

LEPTARTHRA INTERMEDIA, n. sp. (Pl. I., fig. 12.)

Oblong-ovate, dilated posteriorly, metallic blue or violaceous; thorax with transverse and longitudinal depressions; elytra pale fulvous, finely punctured with semi-regular double rows of larger punctures; abdomen pale fulvous. Length, 5—6 lines.

Closely allied to *L. dohrni*, Baly (*Merista rufipennis*, Harold), but quite distinct; much smaller, and less convex and dilated; the first three joints of the antennæ metallic blue, the rest black, extending to more than half the length of the body; thorax scarcely perceptibly punctured, metallic blue or violaceous, the sides with a deep transverse depression, the middle of the disc with a longitudinal groove, which assumes the shape of a fovea near the base; scutellum dark blue; elytra dilated, with a very faint depression below the base, the surface finely and closely punctured, with more regular rows of larger punctures partly arranged in pairs near the suture.

The punctuation of the elytra in *L. intermedia*, of which three specimens are before me, will at once distinguish this species from *L. dohrni*, in which the elytra are finely and evenly punctured throughout, and have also a deep transverse depression below the base, besides being very strongly widened posteriorly; all other characters are very similar in both species. *L. abdominalis*, Baly, has the elytra strongly and irregularly punctured.

LEPTARTHRA GRANDIPENNIS, Fairm.

This species seems to me to be identical with *L. dohrni*, Baly.

TAPHINELLA LONGICORNIS, n. sp.

Black, the head, thorax, and legs pale fulvous; antennæ as long as the body; thorax finely punctured, transverse; elytra black, finely punctured. Length, $1\frac{1}{2}$ line.

Head with a few, extremely minute punctures; eyes large and prominent, the frontal elevations broadly trigonate, nearly contiguous, bounded behind by a deep transverse groove; palpi slender; antennæ as long as the body, slender, the third joint smaller than the second, both very small, the others elongate, nearly equal, the three basal and the terminal one fulvous, the rest black: thorax transverse, the sides nearly straight, the anterior angles oblique, thickened, the surface with an obsolete depression at each side, finely and sparingly punctured; elytra black or piceous, finely but not

very closely punctured; tibiae unarmed, the first joint of the posterior tarsi much longer than the following joints together; anterior coxal cavities closed.

This species exhibits all the structural characters (with the exception of the filiform antennæ) of the genus *Taphinella*, described by myself in the 'Annals of the Genoa Museum,' 1889. The very small second and third joints of the antennæ in connection with the transverse thorax, long metatarsus of the posterior legs, and the closed cavities, are the principal characteristics of the genus. *T. longicornis* almost entirely resembles *T. nigripennis*, Jac., in coloration, but differs in the black under side, the filiform antennæ, and the much smaller size; this difference in the structure of the antennæ (which in the type have their intermediate joints dilated) is, I think, not sufficient to separate the present insect generically.

A few specimens.

BRACHYPHORA, n. gen. (GALERUCINÆ.)

Narrowly elongate; antennæ filiform, their joints gradually lengthened; thorax transverse, the sides nearly straight, the surface obsoletely impressed at the sides; elytra irregularly punctured, their epipleuræ continued below the middle; legs slender; the four anterior tibiae armed with a small spine, the posterior ones unarmed; the first joint of the posterior tarsi as long as the three following joints together; claws appendiculate; anterior coxal cavities closed.

The insect, for which I propose the present genus, and which I am unable to place satisfactorily in any of the numerous genera of *Galerucidæ*, has the general appearance of a species of *Luperus*; the closed anterior cavities and the prolonged elytral epipleuræ would place *Brachyphora* near *Zermyla*, but the general shape of the insect and the unarmed posterior tibiae separate the present genus from that and other genera.

Type. *Brachyphora nigrovittata*.

BRACHYPHORA NIGROVITTATA, n. sp. (Pl. II., fig. 12.)

Fulvous; the terminal joints of the antennæ and the abdomen black; head and thorax finely punctured; elytra very distinctly and closely punctured, flavous, the sutural and lateral margins black. Length, 2 lines.

Head broader than long, the vertex with a few very minute punctures, fulvous, the frontal elevations not very strongly raised, broad and transverse, clypeus strongly swollen and triangular, the penultimate joint of the palpi scarcely incrassate, the terminal one acutely pointed; antennæ about half the length of the body, the five lower joints fulvous, the others black, the first joint as long as the fourth, the second one but slightly smaller than the third, the fourth and following joint very slightly increasing in length. Thorax about twice as broad as long, the sides scarcely perceptibly rounded, the angles not produced, but in shape of a very small tubercle, the surface with a very obsolete small depression at the sides, finely and rather closely punctured, the interstices extremely minutely granulate; scutellum rather broad, trigonate; elytra flavous, more strongly punctured than the thorax, the punctures closely arranged and distinct to the apex, the interstices slightly raised, a sutural broader stripe (suddenly and strongly narrowed

near the apex) and another more narrow one at the lateral margin, extending to the epipleuræ and to the apical angle, black; the breast and legs fulvous, abdomen black; prosternum invisible between the coxæ.

Many specimens.

ANTIPHA NIGROFASCIATA, n. sp. (Pl. II., fig. 6.)

Fulvous; antennæ (the basal joints excepted) and the tibiæ black; thorax transverse, strongly punctured; elytra flavous, strongly and semi-regularly punctured, the sutural and lateral margins, and a transverse narrow band below the middle, black.

Var. The elytral bands nearly obsolete, or fulvous.

Mas. The second and third joints of the antennæ extremely small.

Fem. The third joint of the antennæ longer than the second.

♂. Ovate, convex, scarcely widened behind; the head fulvous, impunctate, deeply foveolate between the eyes, the frontal tubercles narrowly oblique, the clypeus broadly triangular; antennæ extending beyond half the length of the elytra, black, the lower three joints fulvous, the second very small, the third still smaller, the following joints slender, elongate; thorax more than twice as broad as long, the sides slightly rounded, the angles in shape of small tubercles, each furnished with a single hair, the surface fulvous, distinctly but not very closely punctured; scutellum fulvous; elytra flavous, more strongly punctured than the thorax, the punctures arranged in close and rather regular rows, the sutural and lateral margins (including a larger spot on the shoulders), and an oblique narrow band below the middle, black; under side and the femora fulvous; tibiæ and tarsi black; prosternum narrow, but distinct; anterior coxal cavities closed.

The female, in which the elytra show a slight transverse depression below the base, has the third joint of the antennæ nearly three times as long as the second, but does not differ in any other way. In the variety, the elytral markings are obscure fulvous, or sometimes scarcely perceptible.

Many specimens of the type and of the variety.

ANTIPHA BIPARTITA, n. sp. (Pl. II., fig. 5.)

Fulvous; the head, antennæ (the basal joints excepted), thorax, and the tibiæ, black; thorax remotely punctured; elytra strongly semipunctate-striate, dark fulvous, the posterior portion black. Length, $2\frac{1}{2}$ —3 lines.

Var. Elytra entirely fulvous.

♂. Head impunctate, black, the middle impressed with a deep fovea; antennæ nearly as long as the body, the second and third joints very small, the fourth as long as the three preceding joints together, the lower three joints fulvous, the rest black; thorax twice as broad as long, the sides slightly narrowed towards the base, the anterior angles prominent, the surface rather sparingly punctured, a little more closely at the sides, the latter with a small depression; scutellum fulvous; elytra very strongly and closely punctured, the punctures semi-regularly arranged in rows, the apical portion more or less black, the rest fulvous; under side and legs, with the exception of the tibiæ and tarsi, fulvous.

This species, of which many specimens are before me, is subject to variation in regard to colour, the head and thorax being sometimes stained with fulvous, while the elytra in some specimens are entirely of that colour. The female, like the preceding species, has a much longer third joint of the antennæ.

ANTIPHA(?) ELONGATA, n. sp.

Elongate, black, the base of the head and the thorax fulvous; antennæ slender, black; elytra flavous, closely and rather strongly punctured, the extreme sutural margin black; prosternum very narrow, but distinct. Length, 3 lines.

Mas. The second and third joints of the antennæ very short.

Fem. The third joint twice as long as the second one.

Var. a. The head and thorax black.

Var. b. Head and thorax fulvous.

Of elongate, posteriorly slightly widened shape; the head not longer than broad, the vertex fulvous, the lower portion black, eyes large and prominent, the intermediate space impressed with a deep fovea, clypeus strongly raised into a triangular ridge; labrum broad, obscure piceous; palpi not much thickened, the terminal joint acute; antennæ rather closely approached, black, two-thirds the length of the body, the second and third joints in the male extremely short, the third one rather shorter than the second, both moniliform, the fourth longer than the three preceding ones together; thorax transverse, twice as broad as long, the sides scarcely rounded, the anterior angles acute and prominent, the surface obsoletely depressed near the base, nearly impunctate, fulvous; scutellum piceous, trigonate, broad; elytra flavous, rather strongly and very closely punctured, their epipleuræ extending to the apex; under side and legs black, the latter slender, the tibiæ unarmed, the first joint of the posterior tarsi as long as the following joints together; claws appendiculate; anterior costal cavities closed.

In shape and the structure of the antennæ, this species differs a good deal from most of its congeners; but as the principal characters peculiar to *Antipha* (the distinct prosternum, the unarmed tibiæ, and the shape of the thorax) are present, I have included the species in that genus; the very short third joint is peculiar to the male insect only. In one specimen the entire head and the scutellum are fulvous; in another, the head and the thorax are black, and the anterior angles of the latter are not prominent; but as I cannot see any other difference whatever, I have preferred to look upon this specimen as a variety.

Two specimens.

(To be concluded.)

THE LATE JOSEPH SUGAR BALY.

At the meeting of the Entomological Society, on April 2nd, the President alluded to the decease of one,—who had been for many years a member of the Society, and had published much in its 'Transactions,'—Mr. J. S. Baly, who died at Warwick, on March 25th, 1890, aged seventy-three years. The leading features in Mr. Baly's career have been sketched in one of the local papers in an article, from which we make the following extract:—

"His illness only commenced on Wednesday in last week, but he became rapidly worse, and ultimately succumbed to an attack

of jaundice. He died in harness, being fully engaged with his official duties as long as he was able to go about. He was a member of an old Warwick family, being the eldest son of the late Mr. Joseph Baly. His only brother, Mr. Price Richard Baly, was a pupil of Brunel, the engineer, and was extensively engaged in the construction of railways in Brussels, Russia, and the Caspian, until he retired about fifteen years ago. Mr. J. S. Baly, born at Warwick in 1816, and educated at the Grammar School, under the Rev. George Innes, was a student of St. George's Hospital, Hyde Park (at that time the leading hospital); and when he passed his examination there, he received 'the compliments of the court.' He was also, during his earlier years, a pupil at the Shrewsbury infirmary, under Dr. Burd. After gaining his diploma, he pursued his studies in Paris. He settled down for a time in Leamington, and held the appointment of medical officer of the Union for that district. But his scientific tastes attracted him to London, where he secured a very large practice, and formed the friendship of many of the scientific men of the day, including several of the chiefs at the British Museum. He came to be acknowledged as a leading authority on Coleoptera (the beetle family); and a portion of his unique collection, which was of world-wide reputation, was purchased for the British Museum with a large sum of money. He was Fellow of the Linnean and of the Entomological Societies, and a member of all the foreign Entomological Societies, by whom he was constantly applied to for his wide experience in his favourite study. The books he has published on the Coleoptera generally, and especially the family of Phytophaga, to which he gave his chief study, are valuable as the accepted authority in this particular branch. He was hard at work on his favourite pursuit to the time of his death, naming and describing collections sent from foreign Entomological Societies, and preparing a paper, which he has not been permitted to finish. His health first broke down from over-work in London, and he was compelled to give up a large and lucrative practice. He came back to his native town twenty-two years ago, and held the appointments of medical officer of health for Leamington, and also medical officer for the Union Infirmary. These offices gave him ample time for the indulgence of his scientific tastes, and he was one of the hon. curators of the Warwick Museum. He was a man of very extensive research, and his great natural ability would have entitled him to have claimed a far higher position in the medical world than that which he occupied. But his retiring and studious disposition prevented him from reaping the full reward of his merits. Immersed in his favourite pursuits, which he followed with remarkable patience and devotion, he realised the modest ambition of his life, with a full knowledge that his worth was *acknowledged* by men of the highest scientific eminence, who

will mourn his loss as a colleague and a friend. The deceased gentleman leaves behind him a widow, one son (Mr. Price Baly), and five daughters." *

The above information is, we believe, correct, except in one or two minor entomological points, and we are able to add some details about Mr. Baly as an entomologist.

He was not a field-collector, and seems to have paid little or no attention to Entomology till he was approaching middle life. After he commenced medical practice, he was much interested in microscopic work, and possessed what was at that time a splendid instrument, fully provided with all the apparatus for the investigation of opaque objects, and he was expert in its manipulation. This it was that led to his becoming an entomologist. About the year 1850 he visited Mr. S. Stevens, in Bloomsbury Street, in search of objects for his microscope, and he purchased a small collection of Indian Hymenoptera. He entered into a correspondence with Mr. H. W. Bates, who was then in the Amazon Valley, and in the course of this informed Mr. Bates that the marvels of insect-structure revealed by his microscope led him to devote himself more exclusively to Entomology. At that time the collections made by Wallace in the Malay Archipelago and by Bates in the Amazon Valley were arriving in this country, and Baly having a series of the phytophagous Coleoptera from them, found full occupation for his leisure time in the examination and description of the crowd of novelties contained in these and other acquisitions. There was in the Phytophaga, alone, more than work for one man, and Baly appears to have endeavoured to do this work, so far as it was in his power. He was a patient and enthusiastic entomological worker; and when in practice in the suburbs of London, and called to see a patient in the small hours, he would on his return home spend the remainder of the night in his study, instead of going to sleep.

He joined the Entomological Society of London in the year 1850, and he also became a member of the Entomological Club. His writings on Phytophaga are known throughout the world, and he described an enormous number of new species of the group. At the time he commenced amassing a collection, little was known of the Entomology of the tropics; and it is probable that neither he nor anyone else realised the enormous number of species that would have to be dealt with. As these continued to arrive, in apparently ever-increasing numbers, an ordinary man would have been dismayed, and might have abandoned the task he had undertaken as being hopeless of accomplishment; but Baly worked on quietly and steadily, and has, undoubtedly, accomplished much.

Many years ago, Mr. Baly disposed of his collection of Cassididæ to Mr. E. W. Janson; and about the same time, or subsequently, the Sagridæ, Chrysomelidæ, Eumolpidæ, and

other groups, including the Halticidæ, were purchased for the National collection in the British Museum; and the Hispidæ subsequently became part of the entomological property of the nation. After parting with these portions of his earlier collections, Baly chiefly worked at the Galerucidæ, and has left a large collection of these insects in the possession of his family at Warwick.—D. S.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

THE CHEMISTRY OF INSECT COLOURS.—I need hardly say that I am quite delighted that Mr. Coste has taken up this subject, and I wish him all success. If the facts prove in any cases contrary to my hypotheses, so much the worse for the hypotheses; and certainly I desire to get at nothing but the truth. With regard to my statements quoted (Entom. 129), I believe it is true that the white of several Lepidoptera may be turned yellow by a caustic alkali; at all events, *Melanargia* and *Lycæna* spp. But the best account of this is the original one of Mr. Coverdale's (Entom. xvii. 204). I believe I was quite accurate, also, about the *Colias* being turned red by cyanide, and I beg Mr. Coste to experiment again with the cyanide in a closed heated bottle. At a meeting of the Brooklyn Entomological Society, October 6th, 1885 (Ent. Amer. I., 159), Mr. Hy. Edwards exhibited a *Colias eurydice* thus turned red. On a similar effect produced on Hymenoptera, see R. H. Stretch, 'Canadian Entomologist,' 1886, pp. 55, 56. There is one way in which Mr. Coste's difficulty about the effect of the damp cyanide bottle on *Colias* may possibly receive an explanation, namely, that the red colour was produced by an impurity in the cyanide, perhaps some ammoniacal compound. Mr. Geo. Gore ("Electro-Metallurgy") says that, according to Messrs. Glassford and Napier, commercial white cyanide of potassium generally contains about 35 per cent., and often as much as 50 per cent., of impurities, in the form of carbonate and sulphate of potash, chloride of potassium, cyanate of potash, ferrocyanide of potassium, and silica; and if the mixture of salts from which it is made is not dry, ammoniacal compounds are also formed. Thorpe and Fresenius refer also to potassium sulphide as an impurity. Mr. Coste, in regarding himself as practically alone in his new line of research, has apparently overlooked the excellent investigations of Mr. F. Gowland Hopkins, recorded in the 'Chemical News,' August 2nd, 1889, p. 57; and also the researches of A. Bergé, 'Compt. rend. Soc. Entom. Belg.,' November, 1885.—T. D. A. COCKERELL; West Cliff, Colorado, April 18, 1890.

THE SALLOW SEASON OF 1890.—Sallows were in full bloom as early as the middle of February in the South-west of England (Entom. 136), but at the time when florescence of the *Salix* was more general, the nightly meteorological conditions were not altogether favourable. It was thought, therefore, advisable to ascertain if the usual lepidopterous visitors to the sign of "The Catkin" were less numerous than in other years; and with this object in view, some thirty entomologists, residing in various parts of Britain, were invited to report their experience at "sallows" this season. The majority of the gentlemen written to were courteous enough to reply; some, only to say that they had not attempted work at sallows this year;

others, who had interviewed the revellers at the aforesaid hostelry, give the following accounts of the state of affairs in their respective districts:—

Portsmouth.—Mr. T. H. Larcom gives me the following account of his work at the willows this season. I was, unfortunately, too busy to visit them myself. March 11th: At Alder Marsh, near Gosport, *Taniocampa cruda*, one; *Hybernia marginaria* (*progemmaria*), common. March 14th: In the Forest of Bere, near Barn Green, *T. cruda*, abundant; *T. gothica*, common; *Cerastis vaccinii*, *C. spadicea*, *Gonepteryx libatrix*, and *Scopelosoma satellitia*, common. The willow (one bush only) was crowded; a sheet was obtained and the insects shaken into it, and taken into the house to be examined; a strong and cold north-east wind was blowing at the time. On March 15th, at the same place, a specimen of *Nyssia hispidaria* was found on a trunk by Mr. Larcom; this is the first record of this insect in this district that I have met with. March 26th: In company with two members of the P. and G. Natural Science Society, at Alder Marsh, *T. gothica*, common; *T. stabilis*, two; *T. instabilis*, one; *T. rubricosa*, one. April 10th: In the Forest of Bere, *Anticlea badiata*, one, on willow; *H. marginaria* var. *fuscata*, one male.—W. T. PEARCE; 111, High Street, Gosport.

Bristol.—Owing to illness, I did not begin night-collecting till the 26th of March, when I found some of the willow-blossoms already partially over, but a good deal of it was in full blossom. Common moths were certainly abundant enough. *Taniocampa stabilis*, *T. gothica*, and *T. cruda* were in profusion, especially the last-named: and *T. munda* much commoner than it usually is here. *T. instabilis* was rather scarce, *Pachnobia rubricosa* not rare; these, and hibernated specimens of *Orthosia vaccinii*, were the only Noctuae I met with on this and the two succeeding nights. The same species came to sugar on the 29th of March, with the exception of *P. rubricosa*. As to Geometrae, I took a few specimens of *Eupithecia abbreviata*; *Larentia multistrigaria* and *Anticlea badiata* were common. Though not directly connected with willows, I may mention that I met with *L. multistrigaria*, as early as February 17th, at light; and until quite recently have been taking wasted specimens of *A. badiata*. From the appearance of some of the moths on March 26th, I should imagine that they had been out some time; I know that willow was in bloom here on the 12th March. I shortly after left this neighbourhood for a few weeks, and since my return here have met with specimens of *Taniocampa cruda*, *T. gothica*, and *Pachnobia rubricosa* at light; yesterday evening (19th) seeing a specimen of *T. stabilis* on a gas-lamp.—R. M. PRIDEAUX; 9, Vyvyan Terrace, Clifton, Bristol, May 20, 1890.

Devon.—The willows in Devon were in bloom so early this year that, to me, they were useless. I was quite unable to be out at dusk. The few that blossomed as late as April were not attractive to moths. All I took were a few specimens each of *T. gothica* and *T. rubricosa*. Last year the list was *T. gothica*, *T. rubricosa*, *T. gracilis*, *T. munda*, and *T. cruda*. *D. rubiginosa* has not yet fallen to my lot.—M. CRASKE; Newacott, Bridgerule, Hols-worthy, Devon.

Chester.—I consider 1890 as one of the most disappointing years for willow-work that I can remember. In the Chester district the catkins were well open, in sheltered spots, on the 15th of March. At night I examined the flowers, first with the aid of a lamp, and then by beating the higher branches, whilst an inverted umbrella was held beneath. My captures,

arranged according to frequency, were *Taniocampa gothica*, *T. stabilis*, *T. incerta* (many forms being almost as grey as *T. populeti*), and *T. pulverulenta (cruda)*. This was my most successful night with the *Taniocampidæ*, for cold east and north-east breezes set in, and lasted, with little intermission, till April 21st, when the catkins were over. Star- and moon-light also unusually clashed with the sallows, and materially aided in keeping the moths "at home." I did not see *T. gracilis* at all, or, I might add, *Triphosa dubitata*, which usually shows itself on the willow-bloom, with a brilliancy and gloss certainly not suggestive of a hibernated insect. On the night of March 28th, *Anticlea badiata* was unusually abundant with us; and *Cidaria suffumata*, another catkin Geometer, appeared in force on April 18th. Larvæ, probably of *Xanthia fulvago (cerago)*, have been common this season. I usually got one or two in the changing the catkins I used as food for larvæ of *Agrotis ashworthii*.—J. ARKLE; Chester.

Rotherham.—As there are no sallows within ten miles of this place, I have not been able to devote more than one night to them this season. The following insects were observed at the catkins:—*Scopelosoma satellitia*, *Cerastis vaccinii*, *Taniocampa cruda*, *T. gothica*, *T. instabilis*, *T. stabilis*, these were very abundant; *T. rubricosa*, *T. munda*, *T. populeti*, fairly so; and of *Pachnobia leucographa*, four or five were taken. A few trees sugared in the neighbourhood of the sallows were visited by *T. munda*, *T. stabilis*, *S. satellitia*, and *C. vaccinii*.—J. N. YOUNG; 85, Fitzwilliam Road, Rotherham.

North Wales.—I have worked sallows on four evenings this spring; the captures were as follows:—March 27th and 28th: two very favourable evenings, *T. gothica* was abundant, *T. stabilis* and *C. vaccinii* fairly so; I also took a few *T. pulverulenta*, two *T. munda*, and two *T. gracilis*. April 6th: I did not get out till after midnight, when I found two *T. gracilis*, one *T. dubitata*; with *gothica*, *stabilis*, and *vaccinii*, as before. The above were captured near Ruthin. I spent the remainder of April at Bolton, Lancashire. East winds prevailed till the end of the month. April 29th was a favourable evening, although the sallows were very nearly over; I took about two dozen *P. rubricosa*, and a few *T. gothica*.—J. E. R. ALLEN; Ruthin, North Wales.

Aberdeen.—So far as my experience goes, this appears to be a poor district for early moths. My captures at the sallows in April were:—*Pachnobia rubricosa*, *Taniocampa gothica*, *Cerastis vaccinii*, and *Calocampa exoleta*. *Larentia multistrigaria*, *Cidaria suffumata*, *Diurnea fagella*, were common, but did not occur at the sallows.—L. G. ESSON; 6, Stafford Street, Aberdeen, N.B.

HYPSPITES SORDIDATA.—Mr. South, in reference to *Hypsipetes elutata*, writes (Entom. 170) of "the willow and bilberry forms." I assume the Editor to be exact in his terms, but has he been explicit enough in his paragraph? He speaks of "the smaller specimens, whose larvæ feed on bilberry," and of "the large willow-feeding specimens"; and he asks his readers to make certain observations. But, surely, when collecting *elutata* in a district where both willow and bilberry occur, one is not to put down all the small specimens as the "bilberry form," and the large specimens as "the willow form." I collect *elutata* in a locality where both willow and bilberry occur, but could make no useful observation as to whether one "form" has passed its "zenith" before the other, if size alone is to be the criterion. If there be any other mode of differentiating these forms, I should be grateful

for a further description of the "bilberry form," as I must confess my ignorance of it.—A. B. FARN; Fairlawn, Stone, Greenhithe.

I have not particularly noticed the difference in the times of emergence between the bilberry and sawfly forms of *Hypsipetes sordidata* (= *elutata*), as they do not vary very much here, except on the moorlands, where almost everything is later in its appearance. The most curious thing about this species here is that sawfly nearly always produces the perfectly black variety, *infuscata*; and bilberry, especially on the moors, beautifully marked varieties. In a wood close by, in which no bilberry occurs, I annually take a goodly number of larvæ, which always produce the black form, and never any other. I hope this year to have larvæ both from bilberry and sawfly, both from the moors and woods, and will pay attention to Mr. South's observations (Entom. 170).—A. E. HALL; Norbury, Sheffield, May, 1890.

HEPIALUS LUPULINUS IN AUGUST.—On the 1st of August last, I took a specimen of *Hepialus lupulinus* at Lyndhurst, Hants; and another specimen of the same insect on the 17th of August at Broadstairs, Kent. Are not these dates very late for this species? The authorities give May and June as the months for its appearance. I may add that both insects were in good condition.—H. A. HILL; 132, Haverstock Hill, N.W., May 4, 1890.

SPILONOTA PAUPERANA.—I had the pleasure of taking a pair of this insect on the 23rd April; from their condition I should say they had recently emerged. I believe it is more than twenty years since this species has been taken in the London district, and I know of none from elsewhere. I beat them from rose, and I am sorry to say I failed to take more. *S. pauperana* is evidently a very sluggish insect, as they made no attempt to fly when beaten out. The locality is not open to the public, which must be my excuse for not mentioning it. It is in the neighbourhood of the south of London.—C. FENN; Evenden House, Burnt Ash Hill, Lee.

DEILEPHILA LIVORNICA NEAR MANCHESTER.—I have recently added to my collection a fine specimen of *D. livornica* (*lineata*), kindly given to me by Mr. Herbert Massey, who took the moth at rest in his garden in Burnage, near Manchester, on June 15th, 1878. The rarity of the insect, together with the fact of not recollecting any other record of its having been taken in this locality, must be my apology for mentioning a capture made twelve years ago.—B. H. CRABTREE; The Acacias, Levenshulme, Manchester. [The capture of four other specimens in 1878 will be found recorded as follows:—Knutsford, June 11th, Ent. Mo. Mag. xv. 72; Glamorganshire, August, Entom. xi. 190; near Morpeth, August 18th, Entom. xii. 18; near Hartlepool, July, Entom. xii. 19.—ED.]

THE PUPÆ OF *HYBOCAMPA MILHAUSERI* AND *CERURA*.—When I wrote my note on *H. milhauseri* (Entom. 91), I was under the impression that the pupa of *Cerura* was always rounded and dome-shaped in front, and though I have no note on the subject, I believe as regards the British species this impression is correct, and this is confirmed by an examination of the pupa of *bicusps*, the only British species of which I happen to have a living pupa, and which is smoothly rounded in front; but on examining a pupa of *multiscripta*, a North-American species, I find that it has a keeled projection in front, that is a very fair rough blocking out of the special structure of *milhauseri*. From the oral region there originates a ridge reaching forwards, then at a right

angle it proceeds backwards, merging again in the general surface at the extreme top of the pupa; on either side of this ridge is a slight hollow. The angular point of the ridge is rough and rounded, and is quite unsuited for such use as that of *milhauseri*; but there would appear reason to believe that this is really a rudimentary form of the "sardine-opener" of that species, and very possibly it has some use in more accurately directing the action of the cocoon-softening fluid; the cocoon contains wood-chips, just as those of our own *Ceruras* do. I must leave it to American entomologists, if they have not already done so, to define the function of this process, unless some one will generously send me a supply of cocoons, when I will do my best to make the observation.—T. A. CHAPMAN; Firkbank, Hereford.

FOOD-PLANT OF *PLUSIA INTERROGATIONIS*.—The larva of *P. interrogationis* has never been found feeding on the nettles here; they are always found on heather. It seems that some entomologists do not know the proper food-plant of this species, so I thought I would make it known.—L. G. ESSON; 6, Stafford Street, Aberdeen, N.B.

[Mr. McArthur says that *Plusia interrogationis* has the habit of resting on birch stumps, in places where the heather has been burned down during the previous year, and that the female moths deposit their ova on the young heather growing in such spots. He adds that larvæ of the species may be swept off the older heather, but these are almost invariably ichneumonid.—ED.]

PLUSIA IOTA LARVA FEEDING ON HAWTHORN.—It is probably not generally known that the larva of *P. iota* will feed and thrive on hawthorn (*Crataegus oxyacantha*). This fact was indeed new to me until about a week ago, when I received fifty larvæ of the insect in question from East Yorkshire. Among other plants which, as the leaves were more or less consumed, I failed to recognise, was a sprig or two of hawthorn, and with this plant the larvæ have since been supplied. Several are now in pupæ, and all are fast approaching maturity. I may add that I have occasionally found larvæ of *P. iota* on hedge wound-wort (*Stachys sylvatica*).—R. S.; May 20, 1890.

DIANTHÆCIA CARPOPHAGA, Bork., var. *CAPSOPHILA*, Dup.—Referring to *D. capsophila*, in the 'Entomologist's Annual' for 1864, Dr. H. G. Knaggs says:—"It is by no means unlikely that this species may eventually prove to be a variety of *D. carpophaga*; but it seems advisable to hear what the continental authors, who have so unanimously adopted it as a 'good species,' have to say in the matter, before rashly expunging it from our lists."—R. S.

MACROGLOSSA STELLATARUM.—My brother and myself took thirty-one larvæ of *Macroglossa stellatarum*, in various stages of growth, between the 1st and 5th of September, last year, in South Devon. Four of these died, but the rest turned into pupæ, from which the moths emerged at different periods, between October 20th and November 26th, nearly always in the afternoon. We also captured thirteen *P. actæon* in the same locality.—G. M. WELLS; Hurstfield, The Avenue, Gipsy Hill, April 28, 1890.

SMALL EXAMPLE OF THE EARLY BROOD OF *TEPHROSIA CREPUSCULARIA*.—Of *Tephrosia crepuscularia*, I captured on 19th April, here, a very diminutive specimen, only measuring $1\frac{2}{3}$ inch from tip to tip of the wings. It is one of the brown forms, and the markings are much suffused. I

have, before, occasionally seen small forms at this season of the year. That this moth is certainly affected by locality, as stated during the *Tephrosia* controversy, is very evident the more one observes it, and that even in southern forms themselves.—T. B. JEFFERYS; Clevedon.

IS *EUPITHECIA ABIETARIA*, Göze, IDENTICAL WITH *E. TOGATA*, Hübn.?
—Some of the specimens comprised in my series of *E. togata* agree very well with *E. abietaria*, Göze, whilst other examples connect these with typical *E. togata*. All the specimens are from Scotch localities, and the majority were bred from pupæ. The variation in size is considerable; some examples hardly expand three-quarters of an inch, others measure one inch and a quarter. In the large specimens the tips of the wings appear rather more pointed than they do in the small specimens. Some had very bright red bands when they were fresh, but these have now lost their brilliancy. The central black spot of fore wings is always present, but varies in size; in some specimens it unites with one on the costa, and forms a short black fascia. The first and second lines are much nearer together in some specimens than in others, and in a few examples these lines exhibit a tendency to unite below the middle. From all I can ascertain of the appearance and habits of the larva of *E. abietaria*, there is nothing to separate it from that of *E. togata*, and I certainly fail to find that the two insects are specifically distinct in the perfect state. Compared with *abietaria*, *togata* is said to be larger, with bright red bands and larger central black spots, but none of these differences appear to hold good, as there are gradations in expanse and modification of markings. On the Continent, *togata* is much less frequently met with than *abietaria*.—RICHARD SOUTH.

VITALITY OF THE LARVA OF *SPILOSOMA FULIGINOSA*.—In the January and February numbers of 'Insect Life,'—a periodical edited by Professor Riley, and published by the U. S. Department of Agriculture,—is an interesting account of the life-history of *S. fuliginosa*, Linn. The writer, Mr. O. Lügger, says that in the district of St. Anthony, Minn., the species occurs commonly. Late in the autumn, "when the side-walks are covered every morning with a thick layer of frost, the larvæ are rather abundant. They leave their hiding-places and crawl over the side-walks; at this time they are frequently themselves incrustated with crystals of ice. Some few days ago, with the thermometer ranging from 5° to 3° below zero, I found several of them crawling slowly through the snow. When the side-walks, made of boards, become warmed up by the rays of the sun, the caterpillars crawl away to the shady and cooler part." As an instance of the remarkable vitality of the larva, Mr. Lügger observes that on December 3rd, 1889, he found "in a little depression of the soil a clear cake of ice, and embedded in it the larva of the above species. By means of a hot iron I separated a cube of ice with the enclosed larva, and took it to my office. The caterpillar was entirely and solidly enclosed by the ice; no air-spaces could be detected among the hair. How long the caterpillar had been enclosed I could not say. Left the cube of ice in front of my window, where the temperature sunk for two days to 11° below zero. Later the weather moderated, and during the day a little ice would melt near the caterpillar, but never exposing it to the air. After being enclosed for fourteen days, I carefully melted the ice, and removed the caterpillar to a piece of blotting-paper. In less than thirty minutes the larva was crawling about, not injured in the least. Yet, to escape further experimentation, it has shown good sense and

spun up, and transformed into a pupa, healthy to all appearances." From the description of the imago it would seem that the American representative of *S. fuliginosa* is identical with that from Scotland; both are referable to var. *borealis*, Staud.—R. S.

LOCALITY LABELS FOR SPECIMENS.—I have often wondered this question has not been raised before, as I am convinced any publisher would make it pay if it was done in a large systematic way. Would it not be advisable to have a label printed for each county, and, where a large one, indicated by N., S., &c., for north and south, &c.; also, such as London, Manchester, Aberdeen, &c., for the towns where there are a considerable number of entomologists residing. It would be a good plan to leave a space for the strata on which the insects were taken,—chalk, clay, &c.; and of course a place for the date. Size, too, is a most important item, as they cannot be too small, for labelling the Micros, very well. About $\frac{1}{4}$ in. by $\frac{1}{2}$ in. would be ample for any insect, if not too large. Some collectors prefer an excessively minute label, which they pin underneath the specimen; this means the insect being taken up each time reference is made, which does not improve the specimen. In rare cases this can be done as well; but the label pinned at the side of the specimen or series from a particular locality facilitates reference considerably, and is, I think, the better plan.—A. E. HALL; Norbury, Sheffield, May, 1890.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—May 7th, 1890.—Capt. Henry J. Elwes, F.L.S., Vice-President, in the chair. Mr. W. G. Blatch, of 214, Green Lanes, Birmingham; Mr. F. J. S. Chatterton, of 132, Queen Victoria Street, E.C.; Mr. Charles Fenn, of Burnt Ash Hill, Lee, S.E.; and Mr. George B. Routledge, of 50, Russell Square, W.C., were elected Fellows; and Mr. A. E. Stearns was admitted into the Society. The Secretary read a letter from the Vicar of Arundel, asking for advice as to the course to be taken to get rid of the larvæ of a beetle which were destroying the beams of the Parish Church. Mr. C. O. Waterhouse said he had already been consulted on the question, and had advised that the beams should be soaked with paraffin oil. Dr. Sharp, Mr. M'Lachlan, Dr. P. B. Mason, and the Chairman made some remarks on the subject. Dr. Sharp exhibited specimens of *Caryoborus lacerda*, a species of Bruchidæ, and the nuts from which they had been reared. He stated that three of these nuts had been sent him from Bahia by the late Senor Lacerda, about six years ago; that one of the beetles had effected its exit from the nut during the voyage; a second had recently emerged, after the nuts had been in this country for five years; and that a third had undergone its metamorphosis and died within the nut. Dr. Sharp also exhibited several specimens of Diptera collected by Mr. Herbert Smith in St. Vincent, and read a letter from him to Mr. Godman on the subject of the vast number of species of this order which he had recently collected in that island. Mr. M'Lachlan, Dr. Mason, Mr. Waterhouse, and Capt. Elwes took part in the discussion which ensued. Mr. R. F. Lewis, on behalf of Mr. W. M. Maskell, of Wellington, New Zealand, exhibited and read notes on about twenty-five species of Coccidæ from that colony. He also exhibited some specimens of the larvæ and imagos of *Icerya purchasi*, Maskell, obtained

from Natal, where the species had proved very destructive to orange, lemon, and other fruit trees. He also showed specimens of the larvæ of an allied species from Natal, originally assigned by Mr. Douglas to the genus *Ortonia*, but which Mr. Maskell was inclined to regard as a new species of *Iceya*. Mr. McLachlan and the Chairman commented on the interesting nature of the exhibition, and the importance of a knowledge of the parasites of injurious insects, in connection with which special mention was made of the researches and discoveries of Prof. Riley. The Secretary exhibited, on behalf of Mr. T. D. A. Cockerell, of Colorado, a large collection of insect-galls, and read a letter from Mr. Cockerell on the subject. Dr. Mason said he should be happy to take charge of these galls, with a view of rearing the insects and reporting the results. Mr. H. W. Bates communicated a paper entitled "On new Species of Cicindelidæ."—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—April 24th, 1890.—J. T. Carrington, F.L.S., President, in the chair. Mr. F. Warne exhibited a melanic variety of *Hemerophila abruptaria*, Thub., taken in the London district. Mr. Barrett asked whether this species had been recorded for any other neighbourhood. Mr. Briggs, in reply, said it was generally known that it occurred in the north and east of London only. Mr. Carrington, referring to the variety *hadita* of *Spilosoma lubricipeda*, Esp., remarked that between 1860 and 1870 this particular variety only occurred in a timber-yard close to the railway station at York; he had recently visited the neighbourhood, and was interested to find that, although the timber-yard had been taken by the railway company, the variety now occurred in fair numbers throughout the whole district, showing the gradual establishment of certain forms of variation. Mr. Tugwell exhibited specimens of the common butter-burr (*Petasites vulgaris*, Desf.), and made some remarks thereon, mentioning that it was the food-plant of *Hydræcia petasitis*, Dbl. Mr. Tutt said that at Sheffield the species was taken in the factory yards on the plants growing among the refuse, but very rarely among the larger plants growing on the river banks. Mr. Rice, on behalf of Mr. H. Syer Cuming, exhibited, among other documents, the original rules and constitution of the Aurelian Society, bearing date June 1st, 1801: the rules and objects of the Entomological Society of London, founded on the Aurelian Society, and dated May 1st, 1806,—both being signed by the founders of the two Societies; a printed book of bye-laws of the latter Society, date 1807; an autograph letter and circular, signed by A. H. Haworth, dissolving the Entomological Society of London, date April 10th, 1806; a priced catalogue of Haworth's collection, sold at Stevens', June 23rd, 1834, and ten following days; and a catalogue of insects belonging to the Entomological Society, sold at Stevens', April 16th, 1858. Mr. R. Adkin read a paper on the "Occasional Abundance of certain Species of Lepidoptera in the British Islands." [See abstract of this paper on first page of the present number.] Messrs. South, Tugwell, Barrett, Carrington, and others took part in the discussion which followed.

May 8th, 1890.—The President in the chair. Messrs. S. G. C. Russell, of Balham; G. C. Dennis, of York; and J. H. Rowntree, of Scarborough, were elected members. Mr. Charles Fenn exhibited *Hedya pauperana*, Dup. Mr. Moore, galls of the so-called whistling tree, *Acacia fistula*, from Lower Egypt. Mr. Clarke, two series of plants from Cambridge and Penzance. Mr. Step, *Arum maculatum*, L., and gave an interesting account of the economy of the species.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—April 21st, 1890.—Mr. W. G. Blatch, President, in the chair. Mr. E. C. Rye showed *Brephos parthenias* from Cannock, &c. Mr. R. C. Bradley showed Diptera, including *Thereva ardea* from Wyre Forest, new to Britain; *Sapromyza platycephala* from Moseley, also new to Britain; and *Microdon devius* from Wyre Forest, confirmed as British. Mr. W. G. Blatch showed Coleoptera from Cannock,—*Cymurdis vaporariorum*, *Agathidium globosum*, *Homalota diversa*, and *Stenus guynimeri*, all new to the district. Mr. R. Freer read a paper on "Sexual Dimorphism," in which he contended that the pigment in the wings of insects was a development of waste energy; that females, which required much energy for the reproduction of species, and the development of the larger size necessary for that purpose, had little to spare for pigment, and were usually light; while males, which were smaller and used less energy in the reproduction of species, were usually darker. Much discussion followed the paper, in which Messrs. W. G. Blatch, Neville Chamberlain, H. Stone, E. C. Rye, and C. J. Wainwright took part.

May 5th, 1890.—Mr. W. G. Blatch, the President, in the chair. Mr. John Galbraith, of Harborne, was elected a member. Mr. Neville Chamberlain showed *Ennomos quercinaria* and *Ematurga atomaria*, in both of which species the males are larger than the females, and which, therefore, weighed against Mr. Freer's theory of sex, as given at the last meeting. Mr. R. C. Bradley showed Diptera,—*Xylota signis* from Sutton, and *Xabiens sylvarum* from Wyre Forest. Mr. W. G. Blatch showed Coleoptera,—*Calodera athiops*, *Oxyptoda lentula*, *Dimopsis erosa*, and *Homalota diversa*, all from Knowle. Mr. G. H. Kenrick read a paper on "South African Butterflies," in which he gave an account of a recent journey there, and exhibited the species taken, which included *Danais chrysippus* (the commonest of all), many *Acræas*, *Papilios*, *Pieridæ*, &c.; also the moths, *Deiopeia pulchella* and *Sterrhia sacraria*. He showed several very interesting cases of mimicry. Mr. Chamberlain said he had been in Egypt at the time Mr. Kenrick was at the Cape; there he saw very few butterflies, but of those few *Danais chrysippus*, as at the Cape, was much the commonest.—COLBRAN J. WAINWRIGHT, Hon. Sec.

OBITUARY.

ENTOMOLOGY has lost an able, ardent, and most unselfish student in Mr. WILLIAM BERRY FARR, J.P. and Town Clerk of Maidenhead, who died on the 17th instant. Mr. Farr's collection of insects is large and in admirable order. Though of late years Entomology has supplied the chief occupation of his leisure time, and has carried him to almost every district in England, he was in fact an all-round naturalist of wide knowledge and experience. A fourteen years' residence in India afforded him an exceptional opportunity of studying in particular the habits of insects, birds, and reptiles, very many specimens of which attest the energy and success of his pursuit. Of late years Mr. Farr has been in failing health, but his favourite quest afforded him gratification till the last days of his earnest, manly, and well-spent life. We understand that his large collection, both of arms and objects illustrative of various branches of Natural History, may be acquired by the town of Maidenhead on the sole condition that a proper place is provided for its reception.

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[No. 326.]

COLEOPTERA COLLECTED BY MR. PRATT ON THE UPPER YANG-TSZE, AND ON THE BORDERS OF TIBET.

By H. W. BATES, F.R.S., F.L.S.

THE following is a list, with descriptions of new species, of the Coleoptera belonging to the three sections Geodephaga, Lamellicornia, and Longicornia, lately received by Mr. Leech, from his collector Mr. Pratt, in the interior of China. The greater number were collected at Chia-Ting-Fu, on the Min River, a tributary of the Yang-tsze, near the eastern border of Tibet and on the Wa-shan mountains, fifty miles south-west of that city. The two localities are near Mou-pin, a district in which French missionaries have long been settled, and whence numerous collections have been received in Paris and described by French entomologists. Many of the most striking forms enumerated in the following list are consequently already known, though until now wanting in English collections.

Family CICINDELIDÆ.

CICINDELA JAPANENSIS, *Chaudoir*.

Ichang. Found also near Fu-chau.

The examples sent are intermediate between the typical *C. japonensis* of Nipon and the form *C. maritima* of the widely-distributed *C. hybrida*. They differ from the Japanese species in the reddish coppery colour of the upper surface, though they agree with it in the subparallel form and rather fine granulation, and in colour of under-side and legs. The middle fascia of the elytra is less bent towards the apex, and the humeral lunule is generally entire, though sometimes interrupted.

CICINDELA SUMATRENSIS, *Herbst*.

Ichang.

Family CARABIDÆ.

NEBRIA PULCHERRIMA, *Bates*, Trans. Ent. Soc. 1873, p. 236.

Ichang. Found also in Japan, and constant in its coloration,
ENTOM.—JULY, 1890.

—testaceous-yellow, with a round black spot on each elytron a little behind the middle and contiguous to the suture.

CARABUS TIENTEI, Thomson.

Chia-ting Fu (1000 feet), and Wa-shan (6000 feet).

Mr. Pratt had previously taken this species at Ichang and Kiu-Kiang, lower down the Yang-tsze. At Ichang it is smaller, and the peculiar sinuation of the elytral apex in the female, with tooth-like projection of the outer angles, is much less developed. Kiu-Kiang examples measure 37 millims.; those from Chia-ting Fu and Wa-shan are from 36 to 40 millims., but Ichang specimens are only 27—30 millims. Thomson gives 30—32 millims. as the size of the insect he described. The colour is nearly always black, with a slight silky gloss, but individuals occur of a bluish hue, and some have a purple-coppery tinge on the sides of the thorax and elytra. In the largest individuals the sides of the striae are generally free from the row of minute granules which are seen in the smaller ones and in *C. protenes*, and which give the appearance of punctured striae, the striae proper being constantly impunctate.

CARABUS PROTENES, Bates, Proc. Zool. Soc. 1889, p. 217.

Wa-shan and Chia-ting Fu. Taken previously at Ichang.

This species is apparently closely allied to *C. delavayi* (Fairmaire), from Yunnan. The thorax varies considerably in outline, being sometimes—as in the description above cited—elongate, slightly dilated before the middle, and thence narrowed to the apex, but in other examples broader anteriorly, and in others decidedly but gradually narrowed behind, with sinuated margin, and narrow, acute, and deflected hind angles. Occasionally the side carinae of the triplets of the elytra are depressed and sub-interrupted, as occurs in *C. monilis* and allied species.

CARABUS FIDUCIARIUS, Thomson.

Chia-ting Fu. A widely-distributed Chinese species.

CARABUS PRATTIANUS, n. sp.

Closely allied to *C. tienti*, and of the same greatly elongated form, with (in female) strongly sinuated and dentated apices of elytra; the thorax is also similar in being broadly rotundate-dilated in front and strongly narrowed behind, with very little sinuation and obtuse deflexed hind angles, the surface minutely and irregularly rugulose. But it differs conspicuously in the sculpture of the elytra, which consists on each side of three rows of large convex tubercles, separated from one another, and from the sutural and lateral spaces, by a strongly elevated carina; the lateral marginal space has a shorter row of similar but smaller tubercles, followed by a minutely granulated margin; the sutural area is depressed and transversely rugulose. Long. 38 millim. ♀.

Ichang. A single example.

CARABUS MECYNODES, n. sp.

Allied to *C. davidis* (Deyrolle). In form the male, though relatively equally elongate, is more cylindrical than that of *C. tientei* and *C. proteus*, the elytra not being perceptibly widened behind, and the convexity sloping to the apex. The thorax is very similar in form to that of *C. tientei*, being broad and rounded in front and narrowed behind, with little sinuosity, to the subobtusate hind angles, but the surface is much more faintly rugulose. The elytra have the same type of sculpture, viz., three chain-striae on each, separated from one another, and from the sutural and marginal spaces, by three carinae, but the striae are much less deeply incised. The lateral space exterior to the three carinae is minutely granulated in lines. The apex (in the male) is sinuated rather more strongly than in the same sex of *C. tientei*. In colour the species is very different, the head and thorax being dark bluish green and the elytra purple-coppery. The palpi, dilated anterior tarsi, and ventral grooves are as in *C. tientei* and allies. Long. 80 millim. ♂.

Wa-shan. Three examples, all males.

CARABUS VIGILAX, n. sp.

A species of the same group as *C. tientei* (subg. *Morphocarabus*, Géhin), but distinguished from all the others by its very prominent eyes and cordate-quadrate thorax, strongly sinuate and narrowed behind, with outstanding and subacute hind angles. Elongate, slender, elytra moderately elongated, convex behind the middle, and flattened at the sides and apex; black, neck constricted; thorax faintly coriaceous; elytra obliquely subtruncated at the apex, each with three chain-striae, and with four series of triple carinae, the lateral one granulated and less regular, the striae very faintly punctured; the large foveae of the chain-striae impinge in some cases on the adjoining carina on each side, and therefore show an approximation to the type of sculpture characteristic of the *sylvestris* group (subg. *Oreocarabus*, Géhin). The legs are elongate; the anterior tarsi of the male have four nearly equally dilated joints; the 4th to 6th segments of the abdomen have a curved transverse groove: the terminal joints of the palpi are very slightly dilated, even in the male, and the antennae in the same sex are simple and elongated. Long. 22 millim. ♂, ♀.

Wa-shan, alt. 6000 feet; Chia-ting Fu, 1000 feet.

COPTOLABRUS PUSTULIFER, Lucas, Ann. Soc. Ent. Fr. 1867 and 1872, p. 293, t. 14, f. 12.

Mr. Pratt obtained a fine series of this very remarkable species both at Chia-ting Fu and at Wa-shan, all the examples being conformable to the description and figure given by Lucas above cited.

COPTOLABRUS PRINCIPALIS, Bates, Proc. Zool. Soc. 1889, p. 216.

Ichang. Further specimens of this species, distinguished by the elegance of the elytral sculpture from the allied species of similar emerald-green and golden-coppery colours, have been received from the same locality, the neighbourhood of Ichang, whence came the original examples.

COPTOLABRUS LONGIPENNIS, Chaudoir, Ann. Soc. Ent. Fr. 1863, p. 449.

Ichang. In the 'Proceedings Zool. Soc.' 1889, p. 217, I have given the reasons for referring the insect previously taken by Mr. Pratt, at Ichang, to the species described by Baron Chaudoir.

CALOSOMA CHINENSIS, Kirby.

Many examples from Wa-shan and Chia-ting Fu. The species is common in eastern China, and in the north as far as the Amur.

CALOSOMA THIBETANUM, Fairmaire, Ann. Soc. Ent. Belg. xxxi. p. 92.

Apparently an abundant species at Wa-shan and Chia-ting Fu; there is also one example in the collection received from Ichang. The species was first met with by the French missionaries at Moupin, near the Tibetan frontier, and is distinguished from *C. lugens* (Chaud.), and other species of the *C. investigator* group, by the angular dilatation of the sides of the thorax and the non-metallic foveæ of the elytra.

CHLÆNIUS NÆVIGER, Morawitz.

Wa-shan, alt. 6000 feet; Ichang. Found also in Japan.

CHLÆNIUS COSTIGER, Chaudoir.

Wa-shan, alt. 6000 feet. A widely-distributed insect in Eastern Asia, occurring from Japan to Cambodia. Sze-chuen examples resemble those from Cambodia in the thorax being brilliant green, with little trace of coppery reflections.

HARPALUS VICARIUS, Harold.

Wa-shan, 6000 feet; also Eastern Siberia and Japan. A species closely allied to the common European *H. ruficornis* (Fab.). The differential characters relied on by Harold are, however, not constant, some of the Chinese examples having the hind angles quite as rectangular as British specimens. In Japan individuals occur with smooth head and centre of thorax; but others have finely punctured thoracic disk and the head faintly punctured. All the Wa-shan examples are like the last mentioned.

HARPALUS TRIDENS, Morawitz.

Wa-shan. Found also at Ichang and Kiu-Kiang, and in Japan as far north as Hakodate.

HARPALUS CHALCENTUS, Bates, Trans. Ent. Soc. 1873, p. 263.

Ichang. A common species throughout Eastern China, Japan, and Korea.

CURTONOTUS NITENS, Putzeys.

Ichang. Also a widely distributed species throughout the Pacific sea-board of Asia.

PTEROSTICHUS (?) PRATII.

Very near *P. similimus* (Fairmaire), differing in its larger size, more elongate, though robust, form, and the longer, squarer thorax, with nearly rectangular hind angles. Black; head moderate, much narrowed behind

the eyes; frontal furrows faintly impressed, flexuous; antennæ nearly half the length of the body. Thorax as long as broad, gradually and slightly narrowed behind to the apex of the nearly rectangular angles; lateral rim accompanied by a sharply incised furrow; basal foveæ sharply impressed, two on each side, the inner one long, the outer very short and communicating with the inner one by a short basal furrow. Elytra elongated, rounded at the shoulders, obliquely sinuated at apex, broadest far behind the middle, deeply striated; scutellar striae null, except a short oblique incision close to the basal fold; interstices moderately convex, much narrowed near the apex, and the 9th narrow throughout; one dorsal puncture only on the 3rd interstice far behind the middle; the 8th stria regularly ocellate-punctate. Beneath nearly smooth. ♂. Terminal ventral segment with a central sharp carina strongly elevated in the middle. Long. 23—26 millim. ♂, ♀.

Wa-shan. A large series of examples. The species, like *P. similimus* (Fairm.), is allied to the European *P. melas*, but it is a much larger insect than either, and the thorax is differently shaped. The palpi in the male are somewhat dilated, especially the labials, and truncated at the apex. The middle episterna are short and broad.

TRIGONOTOMA DOHRNII, *Chaudoir*.

Ichang. A species of South-eastern China, found at Hong Kong, and also at Saigon in Cambodia.

DOLICHUS FLAVICORNIS, *Fabr.*

Wa-shan. Found in the warmer temperate latitudes throughout Europe and Asia.

COLPODES AMENUS, *Chaudoir*.

Wa-shan. A widely distributed East Asiatic species. *C. superlita*, Bates (Proc. Zool. Soc. 1888, p. 383), from Kiu Kiang, is probably only a variety, in which the produced apex of elytra is truncated and spined at the sutural angle; the thorax is, however, a little shorter and more sinuated behind. The single example from Wa-shan is nearly intermediate between the two forms.

Family COPRIDÆ,

SYNOPSIS DAVIDIS, *Fairmaire*, Ann. Soc. Ent. Fr. 1878, p. 96, pl. 14, f. 5.

Wa-shan. Originally taken by Père David in "Central China." The species is very distinct from the Indian forms previously described, by its subopaque and finely reticulated elytra, in which the striæ are scarcely visible.

ENOPLOTRUPES SINENSIS, *Lucas*.

Wa-shan, alt. 6000 feet. Taken by Père David in the district of Moupin, Eastern Tibet.

ENOPLOTRUPES VARIICOLOR, *Fairmaire*.

Wa-shan, alt. 6000 feet. Recorded by Fairmaire as taken in the interior of China.

(To be concluded.)

DESCRIPTIONS OF NEW SPECIES OF PHYTOPHAGOUS
COLEOPTERA RECEIVED BY MR. J. H. LEECH, FROM
CHANG-YANG, CHINA.

BY MARTIN JACOBY, F.E.S.

(Concluded from p. 197.)

ANTIPHA VARIPENNIS, n. sp. (Pl. II., fig. 7.)

Ovate, widened posteriorly, black; the head, thorax, and the anterior legs testaceous; elytra strongly punctured, testaceous, the sutural and lateral margins metallic dark blue. Length, 2 lines.

Var. Entirely dark blue or violaceous; the head and thorax sometimes margined with pale fulvous.

Head impunctate, with a deep fovea between the eyes; antennæ rather more than half the length of the body, black, slender, the second joint very short, the third slightly shorter than the fourth joint; thorax narrowly transverse, more than twice as broad as long, the surface rather convex, the sides somewhat rounded, the angles slightly thickened but not produced, the anterior ones rather oblique, the disc nearly impunctate; scutellum black; elytra with a scarcely perceptible depression below the base, distinctly punctured in closely approached rows, testaceous, the sutural margin narrowly, and the lateral one more broadly, metallic bluish; under side black; legs more or less testaceous, the tibiæ dark, unarmed; anterior coxal cavities closed.

Of this species two forms are before me, which differ in no other way from each other except in that of colour; and although I have taken the paler form for the type, there are as many specimens of the darker variety contained in this collection. That both really represent the same species is proved by those specimens of the variety which show traces of the pale colour of the type, either at the head, thorax, or elytra. From *A. pretiosa*, Baly, and most of its allies, *A. varipennis* differs in the more convex shape and rounded sides of the thorax, the black antennæ, and entirely or almost impunctate thorax; the much more transverse thorax and its rounded sides distinguishes the species from *A. puncticollis* and its blue varieties.

Numerous specimens of both forms.

ANTIPHA FLAVIVENTRIS, n. sp.

Elongate, piceous below; above metallic blue; thorax strongly punctured (♂), or nearly impunctate and bifoveolate (♀); elytra closely and strongly punctured; abdomen flavous. Length, $2\frac{1}{2}$ —3 lines.

Mas. Head smooth, impunctate, dark blue (sometimes with a fulvous tint), frontal elevations transverse; the clypeus strongly raised, triangular; antennæ half the length of the body, black, the fourth joint one-half longer than the third, the terminal joints rather shorter and thicker; thorax nearly twice as broad as long, the sides straight, the angles tuberculiform, the surface with two foveæ, rather strongly but sparingly punctured, the punctures stronger within the depressions; scutellum black; elytra but slightly widened posteriorly, without any depression below the base, dark metallic blue, strongly punctured in closely approached rows; under side and legs piceous; abdomen flavous or fulvous; tibiæ unarmed, the first joint of the posterior tarsi as long as the following three joints together; prosternum distinct between the coxæ; anterior coxal cavities closed.

Fem. Thorax nearly impunctate, the two depressions deeper; elytra with a lateral ridge below the middle.

This *Antipha* has the same coloration as so many species of *Luperus*, and the differences between the sexes are rather considerable, as pointed out above. The flavous abdomen and more elongate shape separates *A. flaviventris* from its allies inhabiting the same regions.

Six specimens.

LIROETES, *Weise*.

The author, who lately has established this genus on a species of *Galeruca* allied to *Thyllobrotica*, does not mention the distinctly incrassate palpi, nor the length of the first joint of the posterior tarsi, which is as long as the three following joints together. Besides the typical form, *L. æneipennis*, two other species are contained in the present collection.

LIROETES LEECHI, n. sp.

Pale fulvous; the vertex and the scutellum black; thorax trifoveolate, nearly impunctate; elytra metallic green, closely and semi-rugose punctate, the basal portion raised. Length, 4 lines.

Closely allied to *L. æneipennis*, *Weise*, but at once distinguished by the black vertex of the head, and the more transversely-shaped thorax; head nearly impunctate, the vertex black, shining, the lower portion flavous; the clypeus in shape of a transverse swollen ridge; palpi incrassate; antennæ two-thirds the length of the body, flavous, the basal joint sometimes stained with black above; thorax rather more than twice as broad as long, the sides nearly straight, the anterior angles rounded and thickened, the posterior ones obliquely shaped, the surface impressed with some scarcely perceptible punctures, flavous, the sides and the middle of the base with a more or less distinct depression; scutellum black; elytra metallic green, very closely punctured, the interstices slightly wrinkled, the basal portion distinctly raised, the sides with an elongate broad depression, commencing below the shoulders and not extending to the apex; elytral epipleuræ extremely narrow; anterior coxal cavities open.

The specimen, which I look upon as the male, has the abdomen in a too shrivelled-up state to judge of its construction, but there seems to be the same deep longitudinal cavity as is found in *L. æneipennis*.

A single specimen.

LIROETES FULVIPENNIS, n. sp. (Pl. II., fig. 2.)

Reddish fulvous; antennæ and legs black; head and thorax impunctate; elytra extremely finely punctured, the basal portion scarcely raised. Length, 4—5 lines.

Elongate, scarcely widened posteriorly; the head impunctate; antennæ black, two-thirds the length of the body; thorax twice as broad as long, impunctate, the posterior angles oblique; elytra minutely punctured, their epipleuræ extremely narrow; legs black.

Of this species many specimens were obtained. It agrees in every respect with the type of the genus, and the male has the same deep elongate cavity at the abdominal segments, the last ending into a triangularly-shaped point; the fourth segment has

also a small incision at the middle of its margin; in many specimens the sides of the head are stained with piceous; but the general colour of the insect is uniformly darker or paler fulvous, and shining.

LIROËTES ÆNEIPENNIS, *Weise*. (Pl. II., fig. 3.)

A dozen specimens.

MONOLEPTA LEECHI, n. sp.

Black; the head, the basal three joints of the antennæ, the thorax, and the anterior legs, fulvous; thorax finely punctured; elytra closely punctured, black, a transverse narrow band at the middle, yellowish white. Length, $1\frac{1}{2}$ line.

Var. The abdomen (the last segment excepted) flavous.

Head impunctate, the frontal elevations broad, trigonate, the clypeus broadly triangular, smooth, labrum and palpi piceous; antennæ extending to rather more than half the length of the body, black, the basal three joints fulvous, shining, the second and third joints short, subequal; thorax twice as broad as long, the sides very slightly rounded towards the base, the basal margin regularly rounded, the anterior one straight, the angles not produced; scutellum black, impunctate; elytra very closely and finely punctured, their epipleuræ disappearing below the middle; the under side and legs black, the anterior legs fulvous; tibiæ with a long spine, the first joint of the posterior tarsi half the length of the tibiæ; anterior coxal cavities closed.

Closely allied to *M. albofasciata*, Jac. From Burmah, but differing in the colour of the antennæ, that of the legs, and the want of the red colour at the apex of the elytra. In the variety the abdomen is partly flavous.

A few examples.

SEPHARIA, *Fairmaire*.

The author, who established this genus on two species from China ('Annales de France,' 1889), has said nothing about the length of the posterior tarsi, which is as necessary to mention as any other structural character, considering the enormous mass of described genera of Galerucidæ. I have lately received, from the museum of Calcutta, an insect which answers completely Fairmaire's description of his *Tepharia rubricata* from Moupin, with the exception of the size and colour. The Indian specimen labelled "Kullu," instead of being 8 mill. is only 6 mill. in length, and the colour of the upper surface is not fulvous ("rougeâtre clair"), but very pale testaceous; all the structural characters, spots on the elytra and under side agree, however, exactly with the description; to which I may add, that the first joint of the posterior tarsi is much longer than the following joints together. In the Indian specimen there is also a small piceous spot at the under surface of the head and the under side of the thorax at each side, and the abdominal segments are testaceous, with a black triangular spot at each side (Fairmaire describes them as black, broadly margined with flavous).

ALLOPHYLIA, *Weise*.

This genus is, without doubt, identical with *Charidea*, Baly

(Journ. Linn. Soc., vol. xx. p. 157, 1888), and the species described by Weise as *A. aurora* synonymous with *C. fortunei*, Baly, likewise from China. The type of the genus was originally described by Motschulsky as *Galeruca punctato-striata*, and by myself as *G. multicostata*.

GALERUCELLA (GALERUCIDA) NIGRIMEMBRIS, Fairm.

The generic name of *Galerucella* should evidently be substituted for *Galerucida*, since the author compares his species with my *Galerucella semifulva*, and his description agrees with a species of the latter genus, but certainly not with the genus in which he places it.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

IV.—RESULTS.

In this section the bare results of my experiments will be found; whilst in succeeding sections I shall have to explain at some length what is, in my view, their significance, adducing at the same time various details that do not appear now, but may most conveniently be discussed in a *resumé* after the broad facts have been stated.

Now I may explain that the result of every experiment was noted down at once,—that is, as soon as the hour's exposure was completed. From these notes there were afterwards compiled, in systematic form, complete tabulations of *all* the results yielded by these some thousand or two experiments. I do not propose, however (having regard to the exigencies of space, and to the tempers of the compositors), to inflict these tabulations in their entirety on readers of the 'Entomologist,' who might, too, find their patience sorely taxed by an attempt to wade through such a mass of details. Fortunately these results, which it seemed necessary to have thus tabulated for my own use, admit of being very greatly condensed for publication. As regards the effects on black and white, and several minor colours, they may be better described without formal tabulation; whilst for the rest, remembering that most of my reagents employed were superfluous, it will be easy enough to tabulate the results for the half dozen reagents which I have selected for final use. I will give, first of all, the bare results, leaving comment and explanation until afterwards, and taking the colours under the following headings:—Black, white, yellow and orange, red and pink, chestnut-brown, green, blue; and, lastly, a few minor colours, as greyish, brown, and metallic colours (*sic*).

1. BLACK.—Insects experimented on:—*Pieris brassicae*, *Colias edusa*, *Argynnis paphia*, *Melitæa athalia*, *Vanessa atalanta*,

V. cardui, *V. urticæ*, *Melanargia galatea*, *Pararge megæra*, *P. egerides*, *Epinephele tithonus*, *E. hyperanthes*, *Cænonympha pamphilus*, *Lycæna artaxerxes*, *Polyommatus phleas*, *Arctia caia*, *Spilosoma menthastri*, *Acronycta psi*, *Triphæna pronuba*, *Catocala nupta*, *Moma orion*, *Agriopis aprilina*, *Venilia maculata*, *Abraxas grossulariata*, *Amphidasys betularia*, *Larentia fluctuata*, *Tanagra (Odezia) atrata*.

These, it will be noticed, include representatives of all the great divisions of Macro-Lepidoptera, except the Sphingidæ.

The reagents used were, on the average, 14 or 15 to each insect, making, therefore, a total of nearly 400 experiments on this colour (*sic*); and there is the most complete unanimity possible in the behaviour of black throughout all these divergent families, for in every single instance the result has been *nil*. In about seventeen instances I have recorded as the result, "little faded," "trifle faded (?)," "brownier," &c.; but practically, and to all intents and purposes, we may say that, so far as these experiments go, *black* is utterly unassailable by any reagent yet used.*

2. WHITE.—Species experimented on:—*Pieris brassicæ*, *Vanessa atalanta*, *V. cardui*, *Limenitis sibylla*, *Melanargia galatea*, *Arctia caia*, *Spilosoma menthastri*, *Leucoma salicis*, *Hepialus humuli*, *Acronycta psi*, *Catocala nupta*, *Abraxas grossulariata*, *Amphidasys betularia*, *Larentia fluctuata*.

Here, also, are included representatives from each of the main divisions of Macro-Lepidoptera, except the Sphingidæ.

The reagents used were, on an average, 16 to each species, making a total of over 200 experiments on *white* colouring. The results are *almost* as perfectly unanimous as those with black, and, similarly, the result was always *nil*. White is as unalterable as black, and defies equally the action of all my reagents. One honourable and most interesting exception to this otherwise universal sullen indifference must, however, be emphasized,—the *white* of *M. galatea* is changed to a *deep lemon-yellow* by ammonia, and is affected similarly to a greater or less extent by potassic hydrate (sodic hydrate), nitric acid, a *little* by potassic cyanide, and also by 30 per cent. hydrochloric acid; but under the influence of this *last* reagent the yellow was only temporary, as the wing went transparent. *No* other reagents yellowed it. In a few species with white wings the wing became more or less

* It may, possibly, cause some surprise that I have said nothing of any attempt at *bleaching* these colours. As a matter of fact, however, I have—since the first portions of this article were written—tried a few experiments in that direction, using as a bleaching agent hydrogen peroxide, which I thought would be in many ways preferable to chlorine. The results, however, were such as to persuade me that but little was to be gained by the method, and I therefore have not referred to it in the text, although contemplating some further experiments therewith before abandoning it for good.

transparent under treatment; and in *Hepialus humuli* nearly every reagent removed the white appearance, and left a more or less transparent wing. Of a doubtful reaction with *Amphidasys betularia* I will speak later, when discussing these results.*

There is also a special and independent series of experiments that I have made as a forlorn hope of discovering something about this uncompromising pseudo-colour. It was intimated in section III. of my paper, which appeared last month, that an attempt would presently be made to discriminate between the various whites by staining with iodine. Since that passage was written, I have conducted a set of experiments with this reagent; and in order to make the investigation more thorough, I made parallel sets of experiments with four other staining reagents, viz., logwood, rosein, methyl aniline green, and methyl aniline violet. These experiments were made under the same conditions as all previous ones, except that the wings were first damped with alcohol. After one hour's exposure, the staining fluids were thoroughly washed off (no such easy matter), and then the staining effects on the wings were noted.

Logwood.—The results with this were so negative and unsatisfactory as to deserve no record.

Rosein.—Since this stained everything red indiscriminately, it is also useless to detail any particulars.

Methyl aniline green and violet, and iodine.—The results yielded by these reagents are recorded in the annexed table. The iodine was a 16 per cent. solution in absolute alcohol, but the working was rendered less quantitative owing to the partial evaporation of the alcohol after being exposed some time, and the consequent necessity of adding either fresh alcohol or fresh iodine solution. In all probability, however, the total staining effect was produced in the first very few minutes. As to the strength of the two methyl aniline stains, I cannot speak. They were originally obtained by me, as solutions, for use in botanical histological work, and are such as are always sold by microscopic dealers. I found it necessary to dilute them in these experiments.

The significance of the results will be discussed later, in the proper connection; and I need merely draw attention here to the effect on *P. brassicæ* and on *M. galatea*.

* I noticed in one or two cases, when experimenting on other colours, that the very delicate *white fringes* which often border the wing were turned yellow by ammonia, potassic hydrate, and even one or two acids. Instances are afforded by *Lycæna artaxerxes* and *L. corydon* (and also by *Melitea athalia*, with one or two reagents, anyhow). This yellow did not seem to me, however, in all cases so permanent as was the yellow produced in *M. galatea*. I may as well add to the list given above the name of a tropical butterfly, *Papilio menesthenes*, one of a number kindly sent to me by Mr. Geo. C. Griffiths. The wings of this are marked beneath by large patches of white, represented by cream colour on the upper side. The appearance of this white led me to suspect that it might give the *galatea* reaction, and I therefore tested it with the usual reagents. To my disappointment the results were all *nil*; and *galatea* is, for the present, left in her almost unique position.

EFFECT OF STAINING REAGENTS ON WHITE-COLOURED SPECIES.

NAME OF SPECIES.	IODINE.	METHYL VIOLET.	METHYL GREEN.
<i>Pieris brassicae</i>	Light coffee.	Deep <i>thick</i> violet. N.B.	Deep French sky-blue.
<i>Melanargia galathea</i>	Ditto.	A <i>bluer</i> violet. N.B.	Very pale blue.
<i>Vanessa cardui</i>	Coffee-brown. ...	Barely violet, very pale.	((O))
<i>Limenitis sibylla</i>	Almost entirely O.	Semitransparent violet.	Barely coloured.
<i>Hepialus humuli</i>	Beautiful yellow-brown.* ...	Irregularly violet, lighter.* ...	Blue.
<i>Callimorpha hera</i>	Light coffee.	Semitransparent mauve.	Greenish blue, not deep.
<i>Spilosoma menthastri</i>	Only yellowed; veins dark.	Deep violet.	Only lightly stained blue.
<i>Forthesia auriflua</i>	Coffee.	Violet.	Pale lavenderish blue.
<i>Phalera bucephala</i>	Dull coffee.* ...	Very slightly violet.* ...	In part, slightly blued only.
<i>Acronycta psi</i>	Little yellowed only.* † ...	Very slightly violet indeed.*	Pale lavenderish blue.
<i>Orthosia macilenta</i> . ? ...	Light brown.* ...	Transparent violet.	Green-blue irregularly.
<i>Agrotis segetum</i> . ? ...	Light bright yellowish. ...	Transparent violet.* ...	Pale lavenderish blue.
<i>A. xanthographa</i> . ? ...	Ditto.† ...	Transparent violet.	Slightly, and in part, blued.
<i>Phlogophora meticulosa</i> .	Ditto.† ...	Transparent violet.* ...	Scarcely tinted.
<i>Anisopteryx ascularia</i>	Ditto.* † ...	Very slight transparent violet.*	Scarcely tinted.
<i>Abraxas grossulariata</i>	Only yellowed.† ...	Transparent violet.	Slightly, and in part, blued.
<i>Cabera (pusaria)</i>	Slightly yellowed only.* † ...	Ditto.	Very slightly lavenderish.
<i>Melanippe montanata</i>	Light brown.* † ...	Ditto.	Blue.
<i>Amphidasy betularia</i>	Light brown. ....	.....

* In those marked thus *, the fringe line (not fringe) bordering the hind wing was stained far deeper than the rest of the wing.
 † Veins stained deeper. Some such method of staining would probably be found useful in studying the neuration.
 In the five species of Noctuae, the hind wings of course are referred to.

As a matter of convenience, in publishing, we will reserve the tables of results in yellow, red, chestnut, blue, and green, until next month (although naturally they follow on here), and take the results afforded by the remaining and far less important colours.

First as to *brown*. This class is really intended as a sort of appendix to chestnut; for under the latter term are included all brown or chestnut colours that are affected by my reagents, whilst as brown are grouped together all the "indifferentists." It is, perforce, a somewhat heterogeneous assemblage, including many different browns, and two or three odd *chocolates* that I hardly knew how to dispose of, and therefore finally grouped with the browns.

The insects experimented upon were the following:—*Orgyia antiqua*, *Bombyx quercus* (male and female), *Orthosia macilenta* (?), *Mamestra oleracea*, *Cidaria suffumata*, *Coremia ferrugata*, *C. munitata*, and the chocolate (a) blotches and (b) lines on (a) *Rumia cratægata* and (b) *Phalera bucephala*.

On the average twelve or thirteen reagents were used to test each of these species; and, in spite of their heterogeneity, they agree admirably in being a most thoroughly unsatisfactory assemblage. There is nothing really definite to report of any of them, except that in nearly every case the effect was *nil*.

The most especially impervious were *P. bucephala*, *B. quercus*, and *C. suffumata*. In one or two instances *O. antiqua* faded somewhat, and ammonia left it "darker and duller." *R. cratægata* faded a good deal, too, under the influence of the alkalis. *O. macilenta* was changed to lighter and yellower, and *M. oleracea* to a duller brown than the normal.

Metallic spots and markings.—I had looked forward with very great interest to experimenting on these colours (*sic*), but they have proved woefully disappointing. Unfortunately I had only two or three metallic marked specimens on which to experiment, and it would be somewhat premature to conclude that all would behave similarly; but at any rate there is complete unanimity in the few results that I have, and I shall hope for an opportunity of supplementing these later.

The species experimented on were *Argynnis paphia*, *Plusia gamma*, *Euplexia lucipara*, and *Dione passifloræ*.

A. paphia. This was tested by twenty-four reagents, and the silver was left unaffected in each case, with a doubtful exception as regards nitric acid, which perhaps removed a little.

D. passifloræ.* Tested by the chosen seven reagents (see

* A Floridan species of the Nymphalinee, with magnificent blots of silver on under surface of hind wings. This was one of a large number of specimens for which I am indebted to the kindness of Mr. Geo. C. Griffiths, of Bristol. I am also heavily indebted to Dr. Crowfoot, of Beccles, for similar generosity; and gladly take this opportunity of acknowledging the kindness of these gentlemen, as well as

p. 187*), and also alcohol, and quite unaffected by any; except that nitric acid (50 p. c.) seemed to have removed much of the "silver," and exposed the brown wing beneath.

P. gamma. Eight experiments were made on this, and all without effecting any change.

E. lucipara. The doubtful bronzy markings on this were also tested, and without any different result.

Of the remaining colours equally there is nothing satisfactory to report. There are various half-tints and indeterminate shades very difficult to classify, and yielding nothing but negative results when treated. There is, for instance, what I have called *greyish*, under which head I placed the fore wings of *Acronycta psi* and of *Phalera bucephala*. These have been examined by means of most of the reagents, and with practically no results, except that the first seemed in several instances to become a trifle lighter; and the second certainly assumes a very sickly, washed out, indefinite appearance.† One somewhat interesting exception may, however, be noted: the grey of *A. psi* is turned quite black by *argentic nitrate*; but this (like the reactions of white wings with hydriodic acid) is probably due to simple staining.

Cream. An example of this is afforded by the hind wings, and also by the "buff tip," of *Phalera bucephala*. I have examined their behaviour with about a score of reagents each, and the results are all negative. In some cases the cream of the hind wing was a trifle "gone," or the wings partly transparent,—but that was all; and the buff tip was still more obdurate.

In concluding the list I may point out that hundreds of Lepidoptera, chiefly among the Noctuæ and Geometræ, display colours (save the mark!) that would defy any attempt to classify,—half-

of several other correspondents—viz., Messrs. J. Anderson, jun., Carlier, Farren, Jackson, Jones (of Delawarr), and J. J. Weir.

With regard to these tropical species, I have decided not to tabulate any of the results with those previously obtained from English species; for it seems very undesirable to mix up a few tropical species with these now, while reserving for some later date the main body of results that I hope to obtain from extra-British Lepidoptera. On the other hand, several colours very sparsely represented by British species are common in exotic, and it seemed equally foolish to pay no heed to these when discussing the present results, and to be hampered by the limits of unnecessary ignorance. I therefore picked out for immediate experiment, from the specimens sent me, some that appeared likely to afford specially interesting results; and these results, although untabulated, I shall quote in their proper connexion when discussing the various colours. I seem to owe this explanation alike to my correspondents, who might perhaps be surprised at finding so little apparent use made of the specimens that they sent me, and to the general reader, who might be puzzled by finding tropical species alluded to in subsequent pages, whilst not mentioned in the tables.

* After the list of "six" reagents, add "and acetic acid."

† Apparently this is due to the bluish grey scales flaking off, and thereby exposing a lower stratum of scales of lighter hue.

shades of a dubious brownish greyish hue, that can be called nothing in particular. These I have, at least for the present, left alone, feeling fairly certain (a view quite confirmed by the experiments on *bucephala*, *O. macilenta*, *A. psi*, &c.) that no results—at least of a very definite character—would be forthcoming.

The number of heads under which I have grouped the colours may seem very few; but there are only a few distinct colours, and under yellow or red, *e.g.*, are included many different shades and hues. I have endeavoured, in these preliminary trials, to examine types of each *chief* colour in each of the large groups,* so far as possible, and intend now to extend my investigations to foreign representatives of—more especially—Rhopalocera and Bombycidæ (and Sphingidæ), since in these divisions there chiefly occur the brilliant colours: some interesting results may be expected perhaps among some of the Geométræ, but I have small hopes of the Noctuæ, among which bright colours are scarce, and indefinite half-shades the rule.† Some further reference will be made to this below; and it now remains to discuss the significance of the foregoing results, and offer such interpretation of them as we can. I propose to consider them under *two* heads: first, taking their *chemical* aspect; and secondly, their biological or phylogenetic,—in which connexion I shall explain what seems to me their bearing on *Variation*.

(To be continued.)

TWO DAYS' COLLECTING IN NORMANDY.

By JOHN HENRY LEECH, B.A., F.L.S., &c.

I HAVE been frequently asked by British entomologists if I knew of a good collecting-place on the Continent within easy reach, affording a pleasant change for a short holiday, and the prospect of yielding a good return in the way of rare British insects, in addition to a few that have not as yet been recorded from England. The task of combining a short journey, a good collecting locality, and a modest expenditure, was by no means an easy one. As a boy I was fairly well acquainted with some parts of the coast of Normandy, especially the neighbourhood of Havre, and having very pleasant reminiscences of Tancarville (about 25 miles from Havre) I determined to give it a trial this season. Accompanied by Mr. South and Mr. H. McArthur, I left London at 9.45 on Friday night last (June 13th), and arrived at Tancarville by mid-day on Saturday. At first sight the locality bids

* *I.e.*, of course, as represented in England.

† A few experiments have already been made on Coleoptera, Neuroptera, and Diptera.

fair enough to produce no end of rarities in their season. The little village nestling at the foot of the wooded hills, and overshadowed by the noble ruins of the old castle from which it takes its name, faces the River Seine, and is separated therefrom by a broad stretch of marshy meadow land reclaimed from the river. On both sides are high limestone (?) cliffs rising several hundred feet sheer from the plain, and crowned with forest growth. Except on the low ground near the river, extensive woods meet the eye in every direction. The woods explored by us are in all stages of growth, some having been apparently cleared this year, while other parts appear to have been left untouched for ages. All the usual forest trees abound. In some parts birch—accompanied by bilberry, heather, and brake-fern—is luxurious; in others *Euphorbia*, hemp agrimony and foxglove form a striking feature. The ground at the base of the cliffs, especially towards the river, affords good collecting, and is very sheltered and warm. Sugaring was found to be most productive higher up the hills, especially the hill-side facing the castle. Behind the village is a swampy valley, full of willows, salallows, sedges, reeds, &c., that should produce, among other things, many species of *Leucania*. Although the weather, for the most part, was cloudy, and the nights rather raw, and succeeding a long spell of bad weather, we managed in our two days to get together a good long list of captures. The season was evidently a late one, judging by the species taken and the large proportion of freshly-emerged specimens. I can recollect, as a boy, taking, amongst other species in August, *Papilio machaon*, *Argynnis latona*, *Vanessa antiopa*, *Grapta c-album*, *Colias edusa* and *C. hyale*, *Satyrus semele*, *Melanargia galatea*, and *Callimorpha hera*,—the last common on the flowers of hemp agrimony.

The following notes may be of assistance to anyone who proposes to visit the locality during the season:—Leave Waterloo 9.45 p.m. for Southampton, Monday, Wednesday, and Friday; the train runs alongside the steamer, which leaves at midnight, arriving at Havre between 8.30 and 9 the following morning. Return fares, 1st class, 40s.; 2nd class, 30s. Take no luggage except such as can be carried by hand. Drive at once to the railway-station, and catch the 9.28 a.m. (next train 12.28 p.m.) to St. Romain: 1st class, 2 f. 20 c.; 2nd class, 1 f. 65 c. An omnibus takes you from the station to the town of St. Romain for 30 c. At the hotel 'Du Nom de Jesus' an excellent lunch can be had for 2 f. 50 c. or 3 francs, and a carriage obtained to drive to Tancarville (about 11 kil.) for 6 or 7 francs, or, if informed beforehand, the landlord of the hotel at Tancarville will send a carriage to the station of St. Romain for 8 francs, which would save time. At Tancarville there are several inns, the best of which is the 'Hotel du Havre'; the charges are 7 to 8 francs per day, including excellent cooking and very good cider. The travelling expenses

for the complete return journey, 1st class, for one person, amount to exactly £3; of course it would be something less for two or more people, as the cost of carriage, &c., would be shared; a considerable saving could also be effected by travelling 2nd class. It would be well to advise the landlord of the hotel at Tancarville, so that he could reserve rooms, as the accommodation is rather limited, but no doubt beds could be obtained outside. For the return journey, trains leave St. Romain station at 4.5 p.m. and 7.30 p.m., the latter allowing plenty of time to catch the steamer, which starts at 9 p.m. on Mondays, Wednesdays, and Fridays. The train arrives at Waterloo by 10 a.m. The entomologist ought to be able, by leaving London at 9.45 on a Friday night, to spend from 11 a.m. on Saturday to 6 p.m. on Monday at Tancarville, and arrive back in London by 10 a.m. on Tuesday.

LIST OF LEPIDOPTERA TAKEN AT TANCARVILLE,
JUNE 14TH TO 16TH, 1890.

RHOPALOCERA. — *Pieris brassicæ* and *P. rapæ*. *Euchloë cardamines*. *Gonopteryx rhamni*, a few small larvæ on buckthorn. *Argynnis selene*. *Vanessa urticæ*. *V. cardui*, one very worn female; deposited seven eggs in a chain. *Melanargia galatæa*, larva. *Pararge egeria* and *P. megera*. *Epinephele ianira*. *Thecla rubi*. *Lycæna icarus*. *Syrichthus malvæ*. *Nisoniades tages*. *Hesperia sylvanus*.

HETEROCERA.

BOMBYCES. — *Zygæna filipendulæ*, one larva about half-grown. *Hyllophila prasinana*, two specimens: these, from their splendid condition, appeared to have just emerged from pupæ; one example has very distinct streak and blotches of red on the costa and inner margin of fore wing. *Calligenia miniata*, a female; deposited a number of eggs. *Lithosia sororcula* (= *aureola*). *Euchelia jacobææ*. *Arctia villica*. *Spirosoma lubricipeda* and *S. menthastri*. *Hepialus hectus*. *Porthesia similis* (= *auriflua*). *Leucoma salicis*. *Dasychira pudibunda*. *Orgyia antiqua*, larva. *Bombyx neustria*, larva, common. *B. quercus*, larva. *Odonestis potatoria*, larva. *Dicranura vinula*, one very small larva. *Pygæa pigra* (= *reclusa*), larvæ, also very small.

NOCTUÆ. — *Thyatira batis*, at sugar. *Moma orion*, sitting among herbage. *Acronycta psi*, at sugar. *A. rumicis*. *Gortyna ochracea*, larvæ in stems of hemp agrimony. *Xylophasia rurea*, at sugar. *Pachetra leucophaea*, one very fresh example taken at exuding sap of birch tree; on each side of this birch were other trees which had been sugared. *Apamea basilinea*, at sugar. *Miana strigilis*, at sugar. *Rusina tenebrosa*, at sugar. *Agrotis exclamantis*, at sugar. *Noctua brunnea* and *N. festiva*, at sugar. *Triphæna pronuba*, at sugar. *Tethea retusa*, larva, on willow. *Euplexia lucipara*, at sugar. *Aplecta prasina* (= *herbida*) and *A. nebulosa*, at sugar. *Hadena thalassina* and *H. contigua*, at sugar. *Cucullia verbasci*, larvæ common on *Verbascum* and *Scrophularia*; many very small, a few nearly full grown. *Chariclea umbra*, at sugar. *Erastria venustula*, beaten out of undergrowth in the wood above Castle. *E. fasciana* (= *fuscula*), disturbed

from herbage at the edge of wood below Castle. *Euclidia glyphica*. *Rivula sericealis*. *Zanclognatha grisealis*. *Pechypogon barbalis*. *Hypena proboscidalis*.

GEOMETRÆ.—*Epione advenaria*, among bilberry above the Castle. *Rumia luteolata* (= *cratægata*). *Metrocampa margaritaria*. *Boarmia repandata*, not common; one example of var. *conversaria* sitting on the cliff, but quite beyond reach. *B. consortaria*. *Tephrosia luridata* (= *extersaria*). *Iodis lactearia*. *Zonosoma linearia* (= *trilineararia*). *Asthena luteata* and *A. candidata*. *Acidalia ornata*. *Cabera pusaria* and *C. exanthemata*. *Bapta bimaculata* (= *taminata*). *Panagra petrararia*, almost passé. *Minoa murinata* (= *euphorbiata*). *Abraxas grossulariata*. *Lomaspilis marginata*. *Larentia viridaria* (= *pectinaria*). *Eupithecia linariata*, *E. plumbeolata*, and *E. castigata*. *Hypsipetes trifasciata* (= *impluviata*). *Melanippe montanata*, *M. galiata*, and *M. fluctuata*. *Anticlea rubidata*. *Camptogramma bilineata*. *Cidaria corylata*. *Anaitis plagiata*.

PYRALIDES.—*Scoparia ambigua*, *S. cembra*, and *S. dubitalis*. *Pyrausta aurata* (= *punicealis*) and *P. purpuralis*. *Eunychia octomaculata*. *Eurrhyncha urticata* (= *urticalis*). *Scopula olivalis*. *Botys fuscalis*. *Ebulea crocealis*. *Perinophala lancealis*.

PTEROPHORI.—*Platyptilia bertrami* and *P. gonodactyla*. *Mimæseoptilus pterodactylus* (= *fuscodactylus*). *Leioptilus microdactylus*. *Acipitilia pentadactyla*. *Alucita hübnéri*? *Crambus pratellus*, *C. pascuellus*, and *O. hortuellus*. *Rodophæa consociella*, larvæ.

TORTRICES.—*Tortrix ribeana* and *T. viridana*. *Argyrotoza conwayana*. *Penthina pruniana* and *P. ochroleucana*. *Hedya ocellana* and *H. dealbana*. *Aspis udmanniana*, larvæ. *Sericoris urticana*. *Roxana arcuana*. *Orthotania striana*. *Sciaphila subjectana*. *Phoxopteryx myrtilana* and *P. lundana*. *Grapholitha penkleriana*. *Batodes angustiorana*, one worn male specimen. *Padisca profundana*. *Ephippiphora brunnichiana*. *Carpocapsa grossana*. *Stigmonota nitidana* (= *redimitana*) and *S. flexana*. *Dicrorampha politana*, *D. petiverella*, and *D. plumbagana*. *Catoptria hypericana*, common. *Synæthis oxyacanthella*. *Xanthosetia hamana*. *Chrosia alcella* (= *tesserana*, fine and well marked). *Conchylis straminea*.

TINEÆ.—*Endrosis fenestrella*.

Besides Lepidoptera, many species of insects belonging to other Orders were met with; but, excepting the beetles, we did not secure as many samples as we might have done. Mr. Billups has been good enough to identify the specimens taken, and has reported on them as follows:—

The Coleoptera are represented by 39 species, ranging from the Cicindelidæ down to the Chrysomelidæ.

Cicindela campestris, L., was the only species met with representing the first-named Family, and appeared fairly plentiful. *Anchomenus parumpunctatus*, F., *Amara lunicollis*, Schiod., and *Harpalus ruficornis*, F., being the representatives of the Carabidæ: of these there was only one specimen of each taken. Of the Staphylinidæ two species only were met with, — *Philonthus politus*, F., and *P. marginatus*, F., and these sparingly; the Coccinellidæ being represented by several specimens of *Coccinella 14-punctata*, L. Among the Scarabæidæ, *Aphodius fessor*, L.,

and *A. hæmorrhoidalis*, L., two specimens only, but the deficiency was well made up by the abundance of *Hoplia philanthus*, Sulz. A type of *Agrius angustulus*, Ill., represented the Buprestidæ; whilst a specimen each of *Athous hæmorrhoidalis*, F., and *Limonius minutus*, L., did duty for the Elateridæ; the representatives of the Telephoridæ being a solitary male of *Drilus flavescens*, Ol., male and female of *Telephorus flavilabris*, Fall., and a male of *Malachius bipustulatus*, L. *Helops striatus*, Fourc., was somewhat plentiful among the Tenebrionidæ, while the Pyrochroidæ had a single representative in a male of *P. serraticornis*, Scop. Several specimens of both sexes of *Ædemera nobilis*, Scop., and *Æ. lurida*, Marsh, appeared for the Ædemeridæ; the deputies of the Curculionidæ being *Otiorhynchus tenebricosus*, Hbst., *O. picipes*, F., *Phyllobius alneti*, F., *Liophlæus nubilus*, F., *Barynotus obscurus*, F., and *Attelabus curculionides*, L., several specimens of each. The Cerambycidæ were represented by five species, — namely, *Agapanthia lineaticollis*, Don., of which there were several examples of both sexes; *Saperda cascharias*, L., a type only; *S. populnea*, L., several specimens; and one each of *Rhagium inquisitor*, F., and *Pachyta cerambyciformis*, Schor. The Chrysomelidæ were represented by a pair of *Timarchia lævigata*, L., and one specimen of a species closely allied to it, but which I have not yet been able to determine; a single specimen of *Cryptocephalus aureolus*, Suf., also a type of *Chrysomela polita*, L. Of the genus *Lina* there were several specimens of *L. populi*, L., while the remainder consisted of one specimen each of *Goniocтена olivacea*, Forst., *Haltica coryli*, All., and *H. ericeti*, All.

Several fine specimens of Homoptera were also met with in *Triecphora sanguinolenta*, Panz.,* while the Diptera had a representative in a beautiful specimen of the genus *Syrphidæ*. A very fine female of *Trogus alboguttatus*, Gr., represented the Family of Ichneumonidæ.

CONTRIBUTIONS TO THE ENTOMOLOGY OF THE PORTSMOUTH DISTRICT.

By W. T. PEARCE.

COULD we compare a list of the fauna of this district of fifty years ago with one of the present time, we should find that modern improvements (?) had exterminated many interesting forms of life from our midst.

Fifty years ago Portsmouth and Portsea were surrounded by a wall, on which seven species of ferns were to be found; Southsea and Landport, by fields and market gardens. Southsea Common was a marsh, the home of rabbits and occasional hares;

* This insect is abundant all over the district.

in summer the haunt of the nightjar and many warblers; and in winter a hiding-place for the majority of our species of ducks. *Lycæna corydon* could then be taken here, and *Aporia cratægi* was common in Elm Grove. (*Vide* a paper read by Mr. H. Moncreaff before the P. and G. Natural Science Society.)

The wall was demolished nearly twenty years ago; of the ferns I have only found three species on the island. Southsea has become a well-known watering-place, and Landport the busiest part of the town. The rabbits have a feeble hold on the north of the island; hares are very scarce; the nightjar I have never seen or heard here. *L. corydon* occurs very sparingly on Portsdown Hill, and *A. cratægi* has been extinct for twenty years.

My notes are taken from a list of the fauna of the district, compiled by myself and members of the Portsmouth and Gosport Natural Science Society. The district proper is the whole of the land south of Portsdown Hill, enclosed by parallel lines drawn from the east and west ends to the shore; but I shall not confine myself strictly to these limits, as very little has been written on the insects peculiar to this district.

The Rhopalocera are divided among the several families, as follows:—Pieridæ, 8 species; Nymphalidæ, 13; Apaturidæ, 1; Satyridæ, 8; Lycænidæ, 10; Erycinidæ, 1; Hesperiidæ, 5; total, 46 species. Two of them are now extinct, thus reducing the total to 44 species, all of which are to be found within ten miles of Portsmouth Town Hall.

PIERIDÆ.

Aporia cratægi.—Once common in Elm Grove, Southsea, but has now been extinct for about twenty years.

Pieris brassicæ.—Common. In the evening of August 8th, 1887, in Alder Marsh, near Gosport, Mr. T. H. Larcom and myself stood on one spot, and without moving counted, within a space of not more than six square feet, over two dozen (I believe it was twenty-nine) specimens of this species and *P. rapæ*, which were resting for the night on the bramble bushes. A few days previously I counted over fifty white butterflies in the Bury Road; they were, no doubt, a portion of the swarm that visited the southern counties during the autumn of that year. The larvæ of *P. brassicæ* and *P. rapæ* were very numerous in October and November, 1888, at Gosport. *P. rapæ*.—Quite as common as *P. brassicæ*. *P. napi*.—Common, but rarely so common as *brassicæ* and *rapæ*. *P. daplidice*.—Portsdown Hill is the only locality in the district where this insect has been taken. Mr. J. J. Moore took two specimens here; Mr. H. Moncreaff, one; Mr. Taylor, one; a fifth is said to have been taken by another collector; and a sixth was seen by Mr. Larcom and myself on some chalky ground, August 22nd, 1886. I am unable to obtain the dates of the above captures, but none are very recent.

Euchloë cardamines.—Generally common throughout the district. I have several specimens with the inner margin sulphur-yellow. A few years ago Mr. Larcom obtained a male with an orange blotch on the under wing near the hind margin; so far as I can discover it is not a pupal stain.

Colias edusa.—May be met with throughout the district nearly every year. It was very abundant during the last *edusa* year, and since then was most abundant in 1885, when Mr. Larcom and myself met with seventy-five specimens. In 1886, twenty-seven specimens were taken, but none in 1887; in 1888, eight only, and those not in the district; in 1889, thirteen specimens. *C. hyale*.—Scarce; a specimen on Portsdown, August 16th, 1885, Mr. Larcom.

NYMPHALIDÆ.

Argynnis selene and *A. euphrosyne*.—Common in woods north of Portsdown Hill. In May, 1887, Mr. Larcom found a variety of *A. euphrosyne* in Stakes Wood, the silver spots on the hind wings being very large and almost confluent; the black spots on the upper side formed lines, converging from the centre. *A. adippe*.—Occurs some years rather freely in Stakes Wood. In 1881 it was almost impossible to walk through the coverts and see a thistle-head unoccupied by one or more specimens. It also occurs in Havant Thicket and Scratch-face Lane, Stakes. The woods at Southwick and the Forest of Bere are also probable localities. *A. paphia*.—In the same localities as *A. adippe*. An old collector, Mr. H. Shelston, tells me he once found the variety *valesina* in Stakes Wood; neither Mr. Larcom or myself have found it nearer than Lyndhurst. Several specimens of the type were taken years ago at Great Salterns, by Mr. J. J. Moore. I am sorry to say Great Salterns and Highgrove, the only happy hunting-grounds left on Portsea Island, were closed to the public in 1889.

Melitæa aurinia (artemis).—The only locality in this district is Purbrook Common. In 1883, it was abundant; in 1884, it was scarcer; in 1885 and 1886, not one was to be seen; in 1887, about twelve females were seen by Mr. Larcom and myself; in 1888 and 1889, none; on May 26th of the present year, I hunted for more than an hour, and did not meet with a single specimen, and I have not heard of any being seen this season.

Vanessa polychloros.—This insect appears to be disappearing altogether from this district. In 1880, Mr. Larcom took a brood of larvæ at Gosport, and neither of us have seen the species there since. Although stray specimens have occasionally been reported to me from other parts of the district, I have not observed *polychloros* since August, 1883, when I saw two specimens at Warblington, near Havant. *V. urtica*.—Usually common; often abundant. *V. io*.—Often common; but rarely so numerous as *V. urtica* and *V. atalanta*. *V. antiopa*.—One caught at Cosham, by Mr. Tranton, July 29th, 1872. Recorded by Mr. Taylor, Entom. vi. 192. *V. atalanta*.—Common; often abundant. *V. cardui*.—Most eccentric in its appearance. Very abundant in 1879, common in 1880 and 1881, very scarce in 1882 and 1883, common in 1884 and 1885, scarce in 1886, none in 1887, a few in 1888, and a few hibernated specimens only in 1889 (the above are my own experiences only). *V. c-album*.—Recorded in Newman's 'Butterflies and Moths,' by the late Mr. Buckler, as occurring at Farlington. The larva was taken at Purbrook, by Mr. J. J. Moore, in 1886. Neither Mr. Larcom or myself have yet met with this species in any part of the district.

Limenitis sibylla.—This species is probably to be found in all the woods in the district. It is sometimes common in Stakes Wood; I know a collector who took over forty specimens there in one day. The other localities are Havant Thicket; Scratch-face Lane, Stakes; the woods at Southwick; Forest of Bere; and the Grange Wild Grounds, Gosport.

APATURIDÆ.

Apatura iris.—Mr. R. Stent has seven specimens, taken by himself at Southwick; it has been seen by Mr. Larcom and myself, and captured by Mr. Leech, in Stakes Wood. In 1888 a specimen was taken by Mr. Larcom in the Forest of Bere.

SATYRIDÆ.

Melanargia galatea.—I have but one record of this species from Gosport, and that only of a single specimen met with many years ago by Messrs. Lacey, Woodman, and Stevens, and captured by the latter. It is common at Fort Purbrook, Portsdown Hill; it occurs in Stakes Wood and Scratch-face Lane; I once met with it near Leigh Park. There are probably other places in the district that I am not yet acquainted with.

Pararge egeria.—Local, and rarely common. Stakes Wood; Scratch-face Lane, Stakes; Havant Thicket; and Southwick. *P. megara*.—Common throughout the district.

Satyrus semele.—Portsdown Hill, not common; Hayling Island and Browndown, common.

Epinephele ianira.—Common throughout the district. I have a very curious male, taken on Portsdown Hill in 1888; the right upper wing appears to have been tied round the centre in some way whilst developing.

E. tithonus.—Common in every hedgerow. *E. hyperanthes*.—Common in the woods and lanes north of Portsdown Hill. The variety *arete* has been taken at Crook-horn, by Mr. Larcom and myself.

Ctenonympha pamphilus.—Common throughout the district. Specimens having the ocelli on the under side of the lower wings well developed are occasionally taken.

LYCENIDÆ.

Thecla quercus.—In woods throughout the district. It occurs, or used to occur, in a small copse at Great Salterns, Portsea Island. *T. w-album*.—One at Southsea many years ago, Mr. H. Moncreaff. *T. rubi*.—Local. Grange Wild Grounds, and Browndown, Gosport; Stakes Wood. One at Eastney, W. T. P.

Polyommatus phleas.—Generally distributed, and common in places. A specimen of the var. *schmidtii* was taken some years ago by Mr. King, at Highgrove; it has since been destroyed by mites.

Lycana agon.—Mr. Stent tells me this species used to be common on Portsdown Hill; it is now very scarce. *L. astrarche (agestis)*.—Portsdown Hill, not common; Scratch-face Lane, Stakes, one, W. T. P. *L. icarus (alexis)*.—Common. I have two males, with the wings partly white, from Portsdown. Mr. Larcom has a specimen of what I take to be the var. *icarinus* from the same locality; examples showing some variation in the markings of the hind wings are occasionally taken. *L. corydon*.—This species used to occasionally occur on Southsea Common; it is now only to be found on Portsdown Hill, and there only in small numbers. In August, 1888, I counted fourteen females and three or four males; and on August 4th, 1889, I saw eleven females, but no males; this was the only date last year that *corydon* was met with, so that I believe there is reason to think this species will soon be entirely eliminated from our district. Mr. McArthur told me of another place on the hill where it was said to occur, but neither Mr. Larcom nor myself could find it there. *L. argiolus*.—*Sparingly*. Scratch-face Lane, Stakes; common, Grange Wild Grounds,

Gosport. A few years ago Mr. Larcom had a brood of larvæ on the ivy in his garden, in Shaftesbury Road, Gosport. *L. minima (alsus)*.—Portsdown Hill, common, but rather local.

ERYCINIDÆ.

Nemeobius lucina.—In glades in Stakes Wood, not common. A few years ago Mr. Larcom and myself met this species in a meadow between Stakes and Purbrook, but only once.

HESPERIIDÆ.

Syrichthus malvæ (alveolus).—Purbrook Common, few; Stakes Wood, and Scratch-face Lane, Stakes, common.

Nisoniades tages.—Portsdown Hill, few, eastern end, north of Portsdown Hill; common, in woods and lanes. I have never found it south of the hill.

Hesperia thaumas (linea).—Most abundant throughout the district in and near woods. *H. sylvanus*.—Generally distributed, and generally more abundant throughout the district than *H. thaumas*. *H. comma*.—Used to occur on Portsdown Hill, near Paulsgrove. The spot where it was most abundant was taken into the chalk-pit about ten years ago, and the insect has now disappeared. Mr. Larcom and myself paid several visits to the spot during the past six years in hopes of finding this species, but were always unsuccessful.

The Heterocera of this district I estimate at about 800 species. A list of these I hope to publish at no distant date; that is to say, as soon as I can obtain definite information respecting doubtful species, rarities, and other species not on my list.

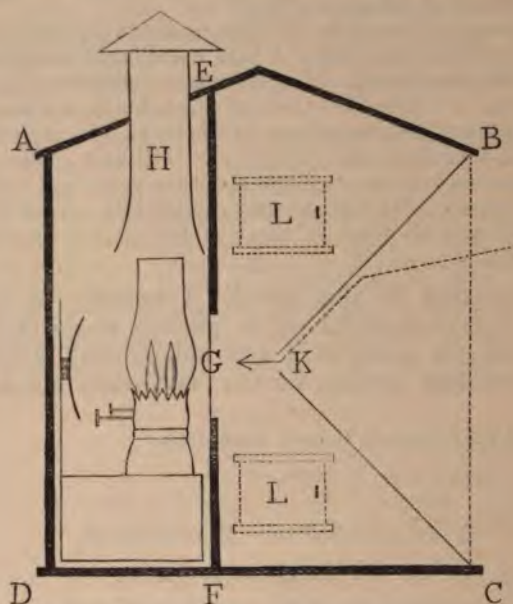
101, Mayfield Road, Seafield, Gosport, June, 1890.

A SUCCESSFUL MOTH-TRAP.

By W. M. CHRISTY, F.E.S.

DURING this and the last three seasons I have used a moth-trap which I had constructed from my own designs, and as it has proved so useful in obtaining me many specimens of Lepidoptera, I thought some account of it, and the work it has done, would interest the readers of the 'Entomologist.' The accompanying diagram of the trap, I think, explains itself; I will, however, venture to describe the details. A, B, C, D, is a box, having a partition, E, F, to separate the lamp-chamber from the moth-chamber. In the centre of this partition is a glass window, G, through which the lamp shines. The box is open at B, C, and there is a door in the back, A, D, through which the lamp may be taken out for cleaning and trimming. There is a chimney, H, coming out through the top to carry off the heat and smoke of the lamp; around the lower part of the lamp-chamber there are ventilation holes to admit air to the lamp and prevent the box becoming very hot.

B, K, and C, K, are two sheets of glass converging from the front of the box, down from the top corner, B, and up from the lower corner, C, toward a point, K, in the centre where they do not quite meet, but provide a long narrow entrance across the centre of the box through which the moths can pass in the direction of the light, towards which they are guided and assisted by the converging plates of glass. The opening I find most convenient is about $1\frac{1}{2}$ in. wide. When inside the box the moths are not very likely to find their way out again through the slit K.



The moth-chamber referred to above is the space, E, F, C, K, B; and having got the moths in, the next thing is how to get them out when the trap is examined next morning. At first I had the roof of the box to open as a lid, and the plates of glass in the front to slide out, but the objection to both these plans is that the opening is so large that the moths may fly out while you are trying to box them inside the trap. I now have small sliding doors, (L, L), two on each side, only large enough to admit the hand and killing-bottle. This arrangement is safer than the other, but not very convenient. I have no arrangement for automatically killing the moths like that described on p. 103 of Dr. H. G. Knagg's little book, but I am thinking of trying the effect of a bag of bruised laurel leaves placed inside the moth-chamber. The killing-drawer attached to the American moth-trap above alluded to seems to me too intricate for practical

work, and any one setting up a moth-trap which has to stand out of doors in all weathers will soon find that the more simple it is in its construction the better. The doors, drawers, lids, &c., are sure to warp, and either stick or become loose, and, in fact, to be a general source of trouble and annoyance.

The lamp I use is an ordinary paraffin duplex lamp with reflector, such as are used to hang up against walls. Care must be taken that the flame of the lamp should be in the centre of the box, and on a level with the opening, *k*. It may be asked, What condition are the moths in when you visit the trap in the morning? To this I reply that, taking them all round, they are in better condition than I expected they would be before I had tried the trap. On an average the specimens are nearly as good as those attracted by light into a dwelling-house; these last have to be netted in the room, and are liable to damage themselves against the ceiling and about the lamp before they are caught.

Looking at my section of the box it will be seen that a good deal of the moth-chamber is in shadow, owing to the partition, *E, F*, being opaque, *i. e.*, wood, and only having a small window in its centre. This gives the moths a chance of settling down quietly out of sight of the lamp, and I think that many of them do so. Many of the moths taken in the trap are absolutely perfect. I do not think that, as a rule, the Geometers injure themselves at all inside the trap. Of course there are exceptions: *Melanippe montanata*, for example, generally flies about and spoils itself.

On the other hand I have this season taken about twenty specimens of *Odontopera bidentata*; most of these were absolutely fresh, and none of them were worn, so that I believe I found them in the same condition as when they entered the trap. Most of the Bombyces and Noctuxæ spoil themselves more or less. Still, there are a good many to be found quite perfect, without the fringes being in the least frayed.

As to numbers caught, the trap is very seldom empty; I often find a dozen moths within and not unfrequently more. I have taken as many as fifty in one night.

I consider this kind of moth-trap a most valuable adjunct to the usual means of collecting Lepidoptera; and as it can be used every night, and all night, with only the trouble of lighting it once in the evening, the advantages are obvious.

I append a list of moths taken in my trap, which has been set either in or close to large woods of oak, beech, and the usual kinds of copse and underwood growing upon a chalk soil.

At Emsworth, in May, June, and July, 1887—90:—

S. ligustri, *N. mundana*, *E. jacobææ*, *S. lubricipeda*, *S. menthastris*, *Hepialus*, one, June 5, (*sylvanus* or *lupulinus*), *D. pudibunda*, *D. falcataria*, *L. camelina*, *N. trepida*, *P. bucephalus*, *D. coryli*, *A. ligustri*, *L. conigera*, *L. lithargyria*, *L. pallens*, *X. monoglypha*, *M. persicariæ*, *R. tenebrosa*, *A.*

segetum, *A. cinerea*, *N. triangulum*, *N. festiva*, *T. gothica*, *D. carpophaga*, *A. advena*, *H. dentina*, *H. adusta*, *T. pastinum*, *E. advenaria*, *M. margaritaria*, *E. dolobraria*, *P. syringaria*, *S. bilunaria*, *O. bidentata*, *C. lichenaria*, *H. abruptaria*, *B. repandata*, *B. roboraria*, *C. biundularia*, or *C. crepuscularia*, *C. luridata*, *C. punctularia*, *G. vernaria*, *I. lactearia*, *E. porata*, *E. linearia*, *E. annulata*, *L. didymata*, *A. remutata*, *A. aversata*, *A. marginepunctata*, *T. amataria*, *C. pusaria*, *A. pictaria*, *P. petraria*, *N. pulveraria*, *L. viridaria*, *E. plumbeolata*?, *E. nanata*, *E. satyrata*, *M. albicilata*, *M. unangulata*, *M. montanata*, *M. fluctuata*, *A. badiata*, *A. derivata*, *C. ferrugata*, *P. tersata*, *P. vitalbata*, *C. corylata*, *C. russata*, *C. dotata*.

The following moths were taken with the trap on the coast of Kintyre, Argyllshire, between Aug. 2nd, and Sept. 2nd, 1889:—

L. impura, *T. fulva*, *H. nictitans*, *H. micacea*, *C. graminis*, *L. testacea*, *M. literosa*, *C. alsines*, *A. tritici*, *A. cursoria*, *A. præcox*, *N. xanthographa*, *T. janthina*, *X. fulvago*, *X. flavago*, *E. lutulenta*, *P. chrysitis*, *S. anomala*, *R. luteolata*, *C. elinguaris*, *A. bisetata*, *O. filigrammaria*, *L. didymata*, *E. subfulvata*, *T. variata*?, *C. immanata*, *C. testata*.

There are generally some *Micros* in the trap but I cannot name them; neither can I specially refer to the various kinds of flies found therein.

Watergate, Emsworth.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

CAPTURES AT THE "SALLOWS."—The sallows in this district were out early this year, some bushes being in full bloom by the 15th March. I was not able, unfortunately, to pay them a visit till the 8th April, and then the insects had become scarce, my only captures being 1 *Taniocampa gracilis*, 3 *T. stabilis*, 1 *T. gothica*, and 1 *T. pulverulenta* (*cruda*). Some friends of mine, however, went to High Beech on the 15th March, and found insects in great abundance and fine condition, the captures being *T. stabilis* (very common), *T. instabilis* (common), *T. gothica* (very common), *T. cruda* (very common), *T. vaccinii* (common), *T. munda* (rare, 2 or 3 specimens only). Solitary specimens of *T. stabilis*, *T. gothica*, *T. gracilis*, and *T. instabilis*, have also been taken with the net, during this month, and in fine condition.—C. NICHOLSON; 202, Evering Road, Upper Clapton, N.E., May 30, 1890.

THE CHEMISTRY OF INSECT COLOURS.—I am much obliged by the references quoted by Mr. Cockerell, in his note on the subject last month (*Entom.* 200), some of which references he had already been kind enough to apprise me of by a private communication. Regarding Mr. Hopkins' investigation, it is quite true that I had overlooked the account given in the 'Chemical News' of last August, and this owing to the fact that I was out of England when the number in question appeared, and had apparently omitted to look up the back numbers on my return. Mr. Hopkins' paper was read before the Chemical Society, but has not, so far, been published in their journal; otherwise, of course, I should have seen it in full there. I *did*, however, see a brief extract of it in one of the scientific journals, but this abstract was so meagre as to have given me a very imperfect knowledge of the nature and extent of Mr. Hopkins' work. Had I been better informed on the subject, I should have made some reference to his work in the first

section of my article. As it is, however, we seem to be working on by no means the same lines. Of M. Bergé's work, I am at present entirely ignorant. With regard now to the *questio vexata* of the cyanide effect. As Mr. Cockerell will have seen by last month's contribution, my experiments have all been made with *solution*; and a solution of potassic cyanide ought, of course, to be far more efficacious than a cyanide-bottle. However, acting on Mr. Cockerell's hint, I have made a set of experiments in a damp and heated cyanide-bottle. The details will be best reserved until, in my article, I come to speak of the *Colias* colours. At present it is sufficient to say that I have got *no red*, so far. Mr. Cockerell's little theory of the impurities does not, I am afraid, help matters much. Such substances as carbonate, sulphate, or chloride of potash, &c., would, even in *concentrated solution*, have probably no effect at all on insect colours; how they could act when in a solid mixture, either cold or warm, I am at a loss to understand; and this remark applies with still more force to silica. As to potassic ferrocyanide, I may refer Mr. Cockerell to my last month's contribution; if it had any effect at all in *solution*, it would turn *Colias* white; mixed with solid cyanide, it would be as harmless as the carbonate, &c. As to ammoniacal compounds, similar remarks would hold good; but ammonia itself in solution has a very powerful effect on *Colias* yellow, but it turns it *pure white* (see next month). The mere vapour of strong ammonia is very slow to act, but eventually a similar effect is produced. So far, therefore, we seem no nearer getting concordant results as to this reddening of *Colias*. Finally, with regard to the *white* of *Lycænidae*, I think Mr. Cockerell will find that dealt with in this month's section of my article (see p. 219).—F. H. PERRY COSTE; Ravenshoe, Burnt Ash Hill, June 8, 1890.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—June 4th, 1890.—The Right Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. Mr. George William Carter, M.A., F.L.S., of Lime Grove, Knottingley, Yorkshire; and Mr. R. Newstead, of The Museum, Chester, were elected Fellows; and Mr. Oliver Goldthwait and Mr. John W. Downing were admitted into the Society. The Secretary exhibited, on behalf of Mr. J. Edwards, Norwich, two specimens of *Ilybius subæneus*, Er., and a single specimen of *Bidessus unistriatus*, Schr. Mr. Champion alluded to the fact that the only recorded British specimens of the first-mentioned beetle had been taken many years ago at Peckham. The species is very closely allied to *I. fenestratus*, F., but the posterior tarsi of the male have the joints externally margined at their lower edge, whereas in the male of the last-mentioned species they are not margined; this character was very plain in the male specimen sent by Mr. Edwards. Lord Walsingham, in alluding to the exhibit, referred to the list of Norfolk Coleoptera compiled some years ago by Mr. Crotch, which appears to have been lost sight of. Mr. Verrall exhibited a specimen of a fly in amber, belonging to a genus allied to the genus *Psychoda*. Mr. M'Lachlan alluded to the damage done by insects to orange-trees in Malta, and stated that the Rev. G. Henslow had lately been studying the question; one of the chief depredators was the widely-spread "fly," *Ceratitis citriperda*, well known as devastating the orange. He found, however, that another and more serious enemy was the larva of a large Longicorn beetle (*Cerambyx*

miles, Bon.), which bores into the lower part of the stem and down into the roots, making large galleries; in all probability the larva, or that of an allied species, is the true *Cossus* of the ancients. Lord Walsingham stated that a species of *Prays*, allied to *P. oleellus* and our common *P. curtisellus*, was known to feed in the buds of the orange and lemon in Southern Europe. Mr. Pascoe, Mr. Champion, and others took part in the discussion which followed. The Secretary, on behalf of Miss Carr, exhibited a portfolio of drawings of Indian Lepidoptera and their food-plants. The following papers were communicated, and were read by the Secretary:—"Notes on the species of the families Lycidæ and Lampyridæ contained in the Imperial Museum of Calcutta, with descriptions of new species, and a list of the species at present described from India," by the Rev. H. S. Gorham; and "A Catalogue of the Rhopalocerous Lepidoptera collected in the Shan States, with notes on the country and climate," by Mr. N. Manders, Surgeon, Medical Staff. The latter paper contained a very interesting description of the chief physical features of the Shan States and neighbouring parts of Burmah.—H. GOSS & W. W. FOWLER, *Hon. Secs.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—May 22nd, 1890.—J. T. Carrington, F.L.S., President, in the chair. Mr. S. Edwards exhibited Lepidoptera from China and India, including examples of *Papilio nigrarus*; also Coleoptera, belonging to the family Sagra, from Africa. Mr. Hawes, ova of *Gonopteryx rhamni*, L., and made some interesting remarks on the way the eggs were deposited. Mr. Frohawk also showed a microscopical drawing of the ovum of the same species, and a coloured drawing of a small plant of buckthorn about three inches in size, upon which he had found seven ova. Mr. Nussey exhibited living larvæ of *Geometra papilionaria*, L. Mr. C. Fenn, a very long series of *Saturnia pavonia*, L., reared from eggs obtained by a female captured at Bournemouth: the specimens were exceptionally large, and the males very brilliantly coloured. He also showed long series of both sexes of *Spilosoma mendica*, Clerck., which he stated were reared by him from ova obtained from a female taken at Eltham, the larvæ being fed on the common broad-leaved plantain; forty-three imagines were bred—twenty-one male and twenty-two female. The females varied little from the ordinary type, with one exception, which was curiously blotched with dark grey on the left superior wing; the males varied from the usual English type up to a dull pale yellowish grey, and quite 50 per cent. diverged more or less from the usual form. The pupæ had been exposed to the weather in a very cold and damp spot, which he thought rather bore out Mr. Tutt's theory that moisture is the cause of melanism or colour variation. Mr. R. Adkin remarked that these specimens showed more variation than was usually found in specimens of this species from English localities, and asked whether anything was known of the male parent, and whether the female differed from the type. In answer, Mr. Fenn said he knew nothing of the male, and there was nothing special about the markings of the female parent. Mr. Tutt pointed out that the variation in the male was somewhat similar to the Irish form known as var. *rustica*. Some observations were made by Messrs. South, Tutt, Carrington, Adkin, and Fenn, on pupæ of Lepidoptera laying over for two or more years.

June 12th, 1890.—The President in the chair. Messrs. G. B. Rye, of Putney; H. McArthur, of Brompton; and A. Ward, of Brighton, were elected members. Mr. Wellman exhibited *Acronycta strigosa*, bred from

pupæ received from Cambridge; *Nemeobius lucina*, L., bred from ova; and *Eupithecia venosata*, Fb., which had been two years in pupæ, and were received from the Isle of Man. Mr. Nussey, *Acronycta myricæ*, Gn., from Rannoch. Mr. F. Warne, *Nemeobius lucina*, L., *Macroglossa fuciformis*, L., &c., from Horsley. Mr. Robson, a banded variety of *Zonosoma punctaria*, L. Mr. Tugwell, *Nemoria viridata*, L., and a prettily marked male resembling the Rannoch form of *Biston hirtaria*, Clerck. Mr. R. Adkin, small and brightly marked specimens of *Herbula cespitalis*, Schiff., from the Land's End, on behalf of Mrs. Hutchinson; also larvæ of *Larentia cæsiata*, Lang, from the Grampian Hills, feeding on heather; and cases and imagines of *Psyche villosella*, Och. Mr. R. Adkin further showed nests of a species of wasp attached to heather from Bournemouth, and from which the imago had just emerged. Mr. Billups said the species was *Eumenes coarctata*, L., one of the solitary wasps, and the only representative of the genus in Britain: he then described the habits of the insect, and exhibited various parasites belonging to the families Ichneumonidæ, Chrysididæ, Syrphidæ, and Staphylinidæ, to the attacks of which insects the Vespidæ are particularly subject. Mr. Billups also exhibited nests of solitary wasps from Borneo, with their maker; also a very fine nest of a social wasp, *Palopus architectus*, St. Farg, with imago from Kentucky. Mr. Henderson, some abnormally large specimens of *Paniscus cephalotes*, Holmgr., bred from larvæ of *Dicranura vinula*.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—May 19th, 1890.—Mr. R. C. Bradley in the chair. Mr. P. W. Abbott showed *Trachea piniperda* and *Eupithecia abbreviata* from Sutton Park. Mr. G. W. Wynn showed *Trachea piniperda* from Marston Green, from which place it had not hitherto been recorded. A number of local captures of Lepidoptera were reported for entry in the book provided for the purpose of recording them.

June 2nd, 1890.—The President, Mr. W. G. Blatch, in the chair. Mr. G. W. Wynn showed *Bombyx rubi* from Sutton Park. Mr. H. M. Lee showed a small wasp, which was taken carrying off a large *Tipula*. Mr. R. C. Bradley showed a box of Tortrices. Mr. W. G. Blatch showed Coleoptera from Ludlow, new to the Midland list, as follows:—*Trechus longicornis*, *Perileptus areolatus*, *Homalota fragilis*, *H. longula*, *H. delicatula*, *H. subtilissima*, *Acobius signaticornis*, *Lathrobium angusticolle*, *Medon ripicola*, *Thinobius linearis*, *T. longipennis*, *Acrulia inflata*, *Trichonyx märkelii*, and a species of *Scopæus*, which may be new. Mr. Blatch also showed *Homalota fallaciosa*, *Acidota crenata*, and *Mycetoporus angulatus*, from Sutton Park, the last being new to the Midland list. Mr. H. Stone showed galls on yew, also some on a species of *Abies*, the latter being apparently produced by a number of minute Acari, seated at the base of the leaves and causing the stem to swell.—C. J. WAINWRIGHT, *Hon. Sec.*

PENARTH ENTOMOLOGICAL SOCIETY.—This Society, formed in 1888, held its second Annual Exhibition and Conversazione on April 10th, in the Public Hall, Penarth. C. T. Vachell, M.D., of Cardiff, presided. The growing importance of the Society was manifested by the large gathering of scientists from the surrounding districts. The locality of Penarth is particularly rich in its Fauna and Flora; this, and the fact of there being no entomological section in the Cardiff Naturalists' Association, has contributed to the rapid growth of this Society, so as to render its reorganization on a larger basis desirable. Several gentlemen of position and

influence in the county have consented to become Vice-Presidents, and arrangements are in progress which—with the zealous prosecution of research shown by the members hitherto—augur a successful and useful future. At the meeting referred to a very large number of cases, containing specimens of local and exotic Lepidoptera and Coleoptera, were exhibited. Sir J. T. D. Llewellyn, Bart., contributed some of the gems of his magnificent collection, supposed to be the most complete in Wales, or the West of England; Mr. Evan John, J.P., of Llantrissant, sent a collection of the rarer Lepidoptera of Glamorganshire; Mr. G. C. Griffiths, of Bristol, forwarded some cases of exotic Lepidoptera: these, added to the extensive collections of several of the members, formed an Exhibition which has not hitherto been equalled in this part of the kingdom. During the evening the Rev. J. H. Hodson, B.A., gave an interesting address on the uses and pleasures of Entomological study, and referred to the destruction of the Scale Insect, in the orange groves of California, by the importation of Coccinellidæ. He also alluded to the pleasure derivable from the study of the habits of ants and beetles, and to the interesting topic of insect mimicry. Mr. J. Storrie, Curator of Cardiff Museum, displayed, by the aid of several microscopes, a number of beautifully prepared sections of insects, and other microscopic objects. The members of the Society are actively engaged in preparing a list of local Lepidoptera, which it is hoped will be of some value as a contribution to Entomological Science.

OBITUARY.

DR. R. C. R. JORDAN, late of Edgbaston, Birmingham, died on the 24th of May, at Teignmouth, Devon, his native place. His grandfather was a banker in that town; his father a solicitor, the head of a firm which still flourishes there. Dr. Jordan himself was born in 1825, and had therefore nearly completed his 65th year. He received his early education at Exeter Grammar School, whence he proceeded to King's College, London. Here he soon distinguished himself, carrying off, among others, the Warneford prize, and was shortly appointed house-physician to King's College Hospital. Later on, when in 1852 he took his M.B. degree, he was awarded the gold medal for proficiency in physiology. For thirty-three years Dr. Jordan practised as a physician in Birmingham, winning the esteem and friendship of high and low alike. For the necessitous poor, indeed, he had especial tenderness and regard; he often would return professional fees when he thought the circumstances of his patients rendered payment onerous; and there were perhaps few men in the profession—so writes the 'Birmingham Daily Post,' from which many of the particulars about Dr. Jordan's life have been derived—who did more gratuitous work. Such a habit, though it brought practice and ensured gratitude, did not lead to an adequate professional income; and when at last his health gave way, and it became necessary for him to leave the Midlands, and seek rest and invigoration from the balmy air of his native place, the affection felt for him by his friends found vent in a private subscription, as a parting testimonial to the man who had spent himself so freely for the general good. Unhappily, as the event proved, the change came too late, and the hopes that had been indulged in of his recovery

have been disappointed. As a naturalist, perhaps, Dr. Jordan's name was not very familiar to the outside world; to those who knew him best his loss will be great. From his early boyhood he had been a lover of Nature, and a careful observer also. His father and grandfather before him were both good ornithologists, and began a work with coloured illustrations of the birds of Devon, but only one or two volumes were published. He himself had a thorough knowledge of the birds of his native county, particularly of the coast species. His first contribution to entomological literature was nearly fifty years ago, in Newman's old 'Entomologist' for 1842, being simply a record of insects, principally Micro-lepidoptera, taken by him when a boy on the coast near Teignmouth. Since then he had been steadily observing the habits not only of Lepidoptera, which was his special branch, but also of Hymenoptera, and had gradually, in consequence, amassed a goodly collection, both British and Palearctic. He travelled abroad a good deal at various times, first trying Germany, then Switzerland, &c., and more recently Norway. He was, however, never what is known as a *Collector*. It would give him quite as much pleasure to see a rare creature alive as to have it in his collection, and much more to watch its habits in its native haunts; and he was thus much more a practical worker (if a quiet one) and a field naturalist than a cabinet naturalist. He was an old correspondent of Zeller's and Wallengren's, and also of other Continental entomologists, and never entertained the "insular preference" until recently so common among British entomologists. Dr. Jordan was also an excellent botanist (he took the gold medal for this in his College course in London), and has left a considerable herbarium of British and Swiss plants. His contributions to entomological literature were not voluminous: the principal ones that I have come across are enumerated below; but though his fame as an entomologist may be limited, to those who knew him best and mourn him most the memory of the man will remain.

"Ever the ashes of the just
Smell sweet and blossom in the dust."

Note on the singular situation of a bee's nest in snail-shells. Zool. 1843, p. 336, pl. 1.

Galls produced by *Cynips quercus-petoli*. Trans. Ent. Soc. Lond. 1854, Ser. 2, pl. 3; Proc. p. 40.

List of Lepidoptera captured in the vicinity of Teignmouth. Entom. 1842, pp. 394—396.

Varieties of Lepidoptera and their causes. Ent. Mo. Mag. i. p. 53.

Aquatic habits of a Hymenopteron. E. M. M. i. p. 186.

Description of the larva of *Pt. brachydactylus*. E. M. M. i. p. 215.

A few days among the Micro-lepidoptera of South Devon. E. M. M. ii. p. 193.

Notes on double-brooded insects. E. M. M. iii. p. 20.

On the similarity of the insects of North America and England. E. M. M. iii. p. 41.

Notes on variation in Lepidoptera. E. M. M. iii. p. 251.

Note on *Pt. isodactylus*. E. M. M. iv. p. 30.

Notes on the larva of *Pt. plagiodactylus*, and on *Ellopija fasciaria* var. *prasinaria*. E. M. M. iv. p. 185.

On the abundance of certain insects in certain years. E. M. M. v. p. 134.

Scoparia zelleri in South Devon. E. M. M. vi. p. 14.

Parasites on Pterophori. E. M. M. vi. p. 138.

Notes on the Skandinaviens Fjädermott of H. D. T. Wallengren. E. M. M. vi. pp. 119, 149.

Four days at the Drachenfels. E. M. M. vii. p. 174.

On the origin of British Lepidoptera. E. M. M. viii. p. 45.

On a probably new species of *Platyptilus*. E. M. M. viii. p. 137.

Notes on mimicry. E. M. M. viii. p. 251.

On mounting small objects for microscopical observation. E. M. M. ix. p. 273.

Note on the first recorded occurrence of *Thalpochares parva* in England. E. M. M. x. p. 40.

Note on the purchase of European Lepidoptera. E. M. M. xii. p. 188.

Notes on some Swiss Lepidoptera. E. M. M. xiii. p. 57.

Notes on the Butterflies and Sphinges of Zermatt and vicinity, observed in June and July, 1878. E. M. M. xvi. p. 86.

Irruption of *Vanessa cardui* and *Plusia gamma* into Devon. E. M. M. xvi. p. 196.

Notes on the Lepidoptera of the Valais. E. M. M. xvii. p. 267.

Comparison of the Pterophori of Europe and North America, suggested by Lord Walsingham's Pterophoridae of California and Oregon. E. M. M. xviii. pp. 73, 117.

On European species of Lepidoptera with apterous or subapterous females. E. M. M. xx. p. 219.

Appeal on behalf of *Danaus chrysippus* and *Hypercompe hera*. E. M. M. xxii. p. 211.

Review of 'British Butterflies and Moths,' by the late Wm. Buckler, Ray Society, vol. i. E. M. M. xxiii. p. 18.

Note on the larva of *Notodonta torva*. E. M. M. xxiv. p. 9.

Note on *Sesia conopiformis* and *Platyptilus fischeri*. E. M. M. xxiv. p. 42.

Mamestra brassicae feeding on oak; Note on migration of insects. E. M. M. xxiv. pp. 63, 64.

Note on small birds and the Lepidoptera eaten by them. E. M. M. xxiv. p. 86.

An entomological ramble at Bergen, Norway, August 20th, 1887. E. M. M. xxiv. pp. 127—130.

Note on *Parnassius delius* in Wales. E. M. M. xxiv. p. 185.

Note on *Ephesia semirufa* in Devon forty years ago. E. M. M. xxiv. p. 274.

A walk in Jersey. E. M. M. xxv. pp. 49—52.

Melanism in Birmingham and South Devon. E. M. M. xxv. pp. 102, 103.

Note on *Triphosa dubitata*. E. M. M. xxv. p. 136.

Note on *Acidalia immorata*. E. M. M. xxv. p. 213.

Tinea pallescentella in Birmingham. E. M. M. xxv. p. 213.

Lepidoptera of Norway. E. M. M. xxv. pp. 362, 363.

Notes on some Lepidoptera captured in Norway. E. M. M. xxv. pp. 439—444.

W. W.

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THE LIFE-HISTORY OF *DECLANA FLOCCOSA*.

By G. V. HUDSON, F.E.S.

ON August 19th, 1889, I obtained a female of this common insect, at rest on a fence, which I conjectured had either hibernated during the winter or else recently emerged from a pupa. From this female I determined to try and obtain ova and rear the insect right through, in order, first, to learn the complete life-history; and, secondly, to observe the effect of different food-plants on the variation of the imago. For this purpose I divided the ova, of which I was fortunate enough to obtain about 100, into two equal lots, placing them in two separate cages, nos. 1 and 2, and feeding no. 1 on *Aristotelia racemosa*, and no. 2 on *Leptospermum ericoides*. The eggs of this insect when first laid are oval in shape and light green in colour, becoming bronzy a few days before the emergence of the larva.

The young larvæ, which appeared on September 20th, were very attenuated, with only ten legs. In colour they were greenish ochreous, striped with brownish pink, which was most apparent near the segmental divisions. Length, $1\frac{3}{4}$ lines. They were very active, and did not eat the egg-shells after emergence.

On October 3rd, the larvæ in cage 1 showed a decided advance over those in cage 2, and had developed a pair of rudimentary prolegs on the fifth abdominal segment; otherwise there were no observable differences between the two lots of larvæ. On October 14th, the larvæ in cage 1 had the two additional prolegs completely developed, and showed distinct traces of the fleshy filaments; those in cage 2 being about as far advanced as the others were on October 3rd. On October 25th, about one half of the larvæ in cage 1 had passed their last moult, and the following description was then made:—The body is subcylindrical in shape, much flattened underneath. In colour the larvæ are pale brownish pink, with numerous irregular brown markings, which in some individuals tend to form two broad subdorsal lines. The under

surface of the larva is pale green. Between this pale green under surface and the dorsal and lateral surfaces the fleshy filaments arise; they are pinkish brown in colour, and, as the larva lies closely attached to the stem of its food-plant, these filaments embrace it on either side, and thus help very materially to render the insect like a swelling in the stem. This is the invariable position of the larvæ when at rest. The larvæ in cage 2 are, on the average, considerably behind the others. They feed chiefly on the opening buds of the food-plant; they are somewhat paler in colour than those fed on *Aristotelia*.

On November 3rd, the larvæ in cage 1 were preparing to descend into the earth, while the others were just passing their last moult; so that it can be safely said that the *Leptospermum* had had the effect of retarding the majority of the larvæ to the extent of one moult behind those fed on the more succulent and nutritious *Aristotelia*.

The difference in colouring between the two lots of larvæ thus treated were, however, of the most trivial description; and I must say that this somewhat surprised me at first, as I had often taken the caterpillars of *Declana floccosa* from both plants in a state of nature, and observed the greatest divergence between them, those off the *Leptospermum* being a very pale ochreous brown, while those from the *Aristotelia* were very much darker, and often mottled with grey, like the stem of the plant. I am inclined to think that these differences have been gradually brought about by the larvæ feeding on the same plant for many generations, and thus the protective resemblances have been inherited and constantly improved through natural selection acting on each lot separately. I should mention that *Leptospermum* and *Aristotelia* do not generally grow near one another. The former plant is found in dry situations, such as the sides and tops of hills; while the latter grows in the damp gulleys, generally on the borders of streams. This circumstance would, of course, tend to prevent two races of *Declana floccosa*—one feeding on *Leptospermum* and the other on *Aristotelia*—from interbreeding, and thus the larval peculiarities adapted to each food-plant would naturally become still more pronounced. The imago of *D. floccosa* is extremely variable in a state of nature, as the following table will show:—

Var. 1.—Which I assume to be the type, has the fore wings pale greyish white, with numerous small brownish black streaks, exhibiting a slight concentration towards the tip of the wing.

Var. 2.—Has, in addition, several large round spots on disc of fore wing.

Var. 3.—Has numerous black spots on fore wings (formerly known as *D. nigrosparsa*).

Var. 4.—Has two conspicuous curved lines on fore wing from costa to inner margin (formerly known as *Declana junctilinea*).

Var. 5.—Has these two lines joined by two others running parallel to inner margin and costa.

Var. 6.—Has curved lines and black spots (*nigrosarsa* and *junctilinea*).

Var. 7.—Has fore wings suffused with dark greyish black, except two broad bands of the original light colour extending from costa to inner margin; hind wings also darker than usual.

Var. 8.—Has a broad dark central band on fore wing.

The moths which resulted from the above-described larvæ only belonged to three of the varieties. The following table, showing the dates of emergence, sex, and variation of the insects from each lot of larvæ, may perhaps be of some scientific interest.

Results of a batch of ova deposited by a female *Declana floccosa* of var. 1, and divided into two equal lots:—

CAGE 1.		CAGE 2.	
Fed on <i>Aristotelia racemosa</i> .		Fed on <i>Leptospermum ericoides</i> .	
12 males and 16 females of these—		15 males and 9 females of these—	
1 male belonged to	var. 2	2 females belonged to	var. 4
1 female "	" 4	6 males "	" 8
11 males "	" 8	5 females "	" 8
5 females "	" 8	9 males "	" 1
10 females "	" 1	2 females "	" 1
Date of first emergence, Dec. 10		Date of first emergence, Dec. 18	
" last "	" 25	" last "	Jan. 3, 1890

From this table it will be seen that there was a much greater mortality among the larvæ fed on *Leptospermum* than those on *Aristotelia*, and also that the proportion of males was much greater in the former group, but the variation does not appear to have been materially effected. A large number of both sexes belonged to var. 1, and evidently inherited the characters of the female parent; while from the great preponderance of var. 8 over the others, I think we may fairly assume that the male parent belonged to that form. Of course I am aware that such experiments as these should be carried out on a much larger scale to give really reliable results, and also extend over several generations; but this I have not at present the opportunity to do. In the meantime I offer the above in order to awake more interest in such observations, which are, I think, much needed at the present time, when the laws governing the formation of species and varieties are attracting so much attention among entomologists.

Wellington, New Zealand, May 30, 1890.

COLEOPTERA COLLECTED BY MR. PRATT ON THE UPPER
YANG-TSZE, AND ON THE BORDERS OF TIBET.

By H. W. BATES, F.R.S., F.L.S.

(Concluded from p. 213).

Family MELOLONTHIDÆ.

MELOLONTHA CUPRESCENS, *Blanchard*, Comptes Rendu, Acad.
Sci., vol. lxxii. (1871), p. 811.

This metallic species of *Melolontha* was originally taken in Moupin by the French missionaries. Mr. Pratt's example agrees well as to colour and sculpture with Blanchard's short description. It is a male, Blanchard's being apparently a female. The antennal club (of black colour) is greatly elongated, three times the length of the remaining (1—3) joints, approaching in this respect the genus *Polyphylla*, and the pygidium is prolonged at the apex nearly as in *M. vulgaris* ♂. The elytral costæ (five on each side, including the sutural, the 4th much abbreviated anteriorly); two subparallel wheals on the disk of the thorax, the occiput and the legs are shining dark coppery; the rest of the dark brassy brown integument is clothed with very dense tawny-brown tomentum.

EUCHEIRUS PARRYI, *Gray*.

Chia-ting Fu. A single female specimen, agreeing with others with which I have compared it from Darjeeling, except in the much fewer reddish spots of the elytra. A rather large basal and a subhumeral spot are seen in nearly the same position, and there is a fine line running parallel to the suture, as in most examples of *E. parryi*; but there is also a broadish submarginal vitta extending from before the middle nearly to the apex, which I do not see in the examples examined of the Himalayan species.

Family RUTELIDÆ.

ANOMALA (EUCHLORA) TRUNCATA, n. sp.

Resembles *A. viridis* (Fab.), and *A. martini* (Hope), but the under-side golden green (not coppery), with the legs, especially the tibiae and tarsi, ruddy golden. The upper surface differs also in being apple-green, with but slight gloss, owing to the denser and rather stronger punctuation, which in places coalesces and forms short transverse wrinkles. The scutellum, sides of the head and thorax, and marginal rims of the elytra, are metallic, light golden green. The elytra show faint traces of punctured striae, one sutural and two pairs on the disk, but they are not strongly impressed as in *A. martini*. A distinguishing character of the species is the strong oblique truncature of the apices of the elytra, the lateral margins of which, distinctly flattened out to the apical curvature, abruptly cease (without forming an angle), the rest of the apical margin being straight and immarginate to the subobtuse sutural angle. The pygidium is closely granulate-strigulose. The under-side of the body is smooth in the middle, and densely punctulate and tawny pubescent on the sides of the sterna and hind coxae, arcuate-punctate (and thinly pubescent) on the sides of the ventral segments. Long. 21—25 millim. ♂, ♀.

Chia-ting Fu.

MIMELA POMACEA, n. sp.

Of oblong form (at least in the female, the only sex known); elytra relatively elongate. Above dark apple-green, without metallic lustre; the clypeus and lateral border of the thorax yellow. Rather strongly punctured, more finely and sparsely on the crown and thorax, which are hence more glossy than the clypeus and elytra; on the latter the punctures lie very close, without coalescing, and are arranged in numerous rows on the disk and sides. The antennæ, legs, and under-side are reddish, with a coppery tinge; the femora paler; the tarsi nearly black, and the sides of the abdomen very dark metallic green. The breast is clothed with longish tawny hairs; the abdomen and legs more scantily hairy; the pygidium is closely and finely confluent-punctate, subopaque, and hairy on its borders. The mesosternum has an acute process, reaching a little further than the coxæ. Long. 20 millim. ♀.

Wa-shan.

Family CETONIIDÆ.

NEOPHÆDIMUS AUZOUXI, Lucas, Ann. Soc. Ent. Fr. 1869; 1872 p. 280, pl. 14, f. 1—3, ♂, ♀.

Wa-shan, 6000 feet. Previously found by Père David at Moupin; on leaves of Indian corn, in August, according to Lucas.

RHOMBORHINA JAPONICA, Hope.

Wa-shan and Chia-ting Fu. Differs in no respect that I can discover from Japanese examples.

CETONIA MARMORATA, Fabr.

Var. *cathaica*.

Belongs to the series of species and local varieties closely allied to the European *C. marmorata*, in which the clypeus is nearly straightly truncated in front, the pygidium slightly and evenly convex in both sexes, and the abdomen in the male longitudinally grooved and depressed. The colour above and beneath, including the legs, is dark green, with strong brassy or golden reflections, and with the usual short depressed transverse lines and spots on the elytra clothed with chalky tomentum. The head and thorax are generally spotless, but the latter in some examples has four small white spots arranged in a wide quadrangle, and other white streaks in the marginal grooves. The form is always relatively broader than in either *C. marmorata* or *C. submarmorea*, and the surface more polished. The sides of the clypeus are not sharply elevated, the front margin is acutely reflexed and without sinuation, and the forehead is broadly convex down the middle and only sparsely punctured. The thorax is rather sparsely punctured, and on the sides only, the præscutellar sinuation strongly marked. The elytra are strigulate on the sides and near the shoulders, and in the usual postmedian depression, elsewhere smooth. The pygidium is very slightly convex in the middle in both sexes, and loosely transversely strigulose. The hind tarsi are robust, in the male as long as the tibiæ, in the female shorter. The femora and tibiæ are strigulose, like the pygidium; the hair fringe of the femora and inner side of hind tibiæ is orange-tawny. The mesosternal process is broad and arcuated in front as in *C. marmorata*. The sides of the metasternum are strigose and spotted with chalky tomentum, and the abdomen has two rows of transverse tomentose spots on each side, which are smaller in the female than in the male, and sometimes wanting. Long. 21—25 millim. ♂, ♀.

Wa-shan and Chia-ting Fu. Many examples.

This species is probably sometimes mistaken for *C. confuciana*, Thomson, which it resembles in colour and sculpture. But the description of that species clearly refers to another Chinese form in which the apex of the clypeus is reflexed and bifid. At least this is the only way in which we can interpret the phrase "Caput antice bituberculatum," as applied to a *Cetonia*. The *C. confuciana*, Thoms., will therefore be a local form of *C. submarmorea*, or a species closely allied to it, which belongs to a distinct group distinguished by the gibbous apex of the pygidium in the male. Among the more northerly species or races *C. marmorata* var. *cathaica* comes nearest to *C. insperata*, Lewis, differing from it chiefly in colour and size, and especially in its much broader form.

CETONIA SUBMARMOREA, Burmeister.

Chia-ting Fu.

A dark brassy green, and less closely punctured variety, resembling therefore the above-described *C. cathaica*; but the bifid clypeus and the gibbous pygidium and scarcely depressed abdomen of the male leave us in no doubt that it belongs to the *C. submarmorea* group.

CETONIA VIRIDI-OPACA, Motschulsky.

Chia-ting Fu. A single example, agreeing in form and colour with examples of Motschulsky's species from the Amur, but differing somewhat in sculpture. *C. viridi-opaca* is known to belong to a very variable series of the genus, the specific limits of which have been subject to much discussion.

Family LAMIIDÆ.

LAMIOMIMUS GOTTSCHER, Kolbe, Archiv. für Naturgesch. 1886, p. 224, tab. xi. fig. 39.

Two examples from Ichang, differing in nothing, except the darker (brassy blackish brown) ground colour, from those found in Korea and the neighbourhood of Peking.

CYRIOCRATES HORSFIELDII, Hope.

Ichang. One small example.

MELANAUSTER CHINENSIS, Forster.

Chia-ting Fu.

COSCINESTHES, nov. gen.

A Monohammid form, with a sharp and complete margin to the cicatrice of the scape, rather narrowly divaricated tarsal claws, and simple outer edge to the intermediate tibiæ. These characters bring it into near relationship with *Eutaniopsis* (Gahan), but the facies and other structural features are very different. The head is rather narrow, the front parallel-sided, but the antenniferous tubercles contiguous at the base and separated above by a narrow cleft; the lower lobe of the eyes narrow, and barely reaching halfway to the base of the mandibles. The antennæ (♀?) are a little longer

than the body, very scantily fringed at the base; the scape rather short, obconical; the 3rd and 4th joints equal, each about one-third longer than the scape, 5th a little shorter, 6th to 11th decreasing in length and thickness. The thorax is cylindrical, much narrower than the elytra, constricted near the base, but not narrower behind than in front, as in *Eutaniopsis*; the lateral spines sharp, their basal dilatation very slight. Elytra moderately elongate, somewhat flattened above, rounded at the apex; shoulders rectangular. The anterior haunch-sockets are rather widely open behind. The tarsal claws small and weak; they are not so nearly parallel as in *Eutaniopsis trifasciella*, but at the same time they are not strictly divaricated.

COSCINESTHES POROSA.

Black, thinly clothed with coarse adpressed, reddish brown pile; antennal joints 3rd to 11th grey at the base, the length of the grey ring increasing towards the apex. Head rather strongly punctured; thorax coarsely granular; elytra granulated close to the base and on the shoulders, the rest of the surface cribbled with mostly large, rounded and contiguous punctures or foveæ; the elevated parts of the surface are black and shining, and the under surface is minutely spotted with black. Long. 21 millim.

Wa-shan, alt. 6000 feet. One example.

BATOCERA LINEOLATA, Chevrolat.

Chia-ting Fu. Described by Chevrolat from examples received from Shanghai. The species is found also in Japan and in Formosa, and is subject to considerable variation both in form and markings.

BATOCERA DAVIDIS, Deyrolle, Ann. Soc. Ent. Fr. 1878, p. 131.

Chia-ting Fu. One example referred with some hesitation to this species.

APRIONA RUGICOLLIS, Chevrolat.

Like *Batocera lineolata*, recorded originally from Shanghai and subsequently proved to be not uncommon in Japan. Occurs also at Amoy and other places in Eastern China.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS

By F. H. PERRY COSTE, F.C.S.

IV.—RESULTS (continued).

EXPLANATION OF THE TABLES.*

"O" signifies that the colour was unaffected. A single or double bracket enclosing the cipher, thus (O) ((O)), slightly qualifies it; such must be read as "practically unaffected," &c.

A dash — signifies that no experiment was made in such cases.

"Gone," is given as the result in some cases; these were cases in which no definite colour change could be noted, but the original colour had certainly disappeared. *Hepialus humuli* may be taken as a strikingly unsatisfactory instance in point.

* There are included in these tables several species not really British (see footnote, p. 222); but these are either occasional visitors or closely allied to native species, which I was unable to obtain.

LOUR =
YELLOW
AND
ORANGE } IN

REAGENT

REAGENT	<i>Papilio machaon</i>	<i>Vanessa antiopa</i>	<i>Euchloë cardamines</i>	<i>Cotias edusa</i>	<i>Gonipteryx rhamni</i> , ♂	<i>Lycena alexis</i>
Hydrochl. acid, strong	White	Faded to whitish	Faded to white	Quite white	Whitened	BECAME
Nitric acid, 50 per c.	White	O	White	White	Good deal gone*	((O))
Sulphuric acid	White	Whitish	White, & faded yellow	White	Gone, whitish	O
Acetic acid, strong	White	Whitish, semitransp.	O	O	(O)?	O
Potass. hydrate, 25 p. c.	White	Whiter, semitransp.	White (via yellow)	Quite white	Nearly all gone	Gone (whitish)
Ammonia, strong	White, partly transp.	Whiter	Quite white	Quite white	Whitened	Gone (whitish)
Sodic hydrate, 10 p. c.	White, little transp.	A very unsatisfac- tory colour indeed	White	Quite white	Less yellow, whiter	Paler, half-faded
Number of other re- agents tried, and general result	The yellow at tips less susceptible than rest		Three	Three	(Similar or negative re- sults with thirteen other reagents; an unsatisfactory colour	Results of 12 other reagents, = O. By phenol, very faded
	<i>Calli. hera lutescens</i>	<i>Arctia villica</i>	<i>Hepialus humuli</i> , ♀	<i>Rumia crategata</i>	<i>Venilia maculata</i>	<i>Camptogram. bilineata</i>
Hydrochl. acid, strong	O	O	BECAME	BECAME	BECAME	BECAME
Nitric acid, 50 per c.	O	O	{ A sickly yellowish,	O, or little whitened	O	Faded to nearly white
Sulphuric acid	O	O	{ nearly transparent	Fairly whitened	(O)	Faded whitish
Acetic acid, strong	O	O, trifle transparent	Towards tr. yellowish	Dull light brownish	O	Trifle reddishened
Potass. hydrate, 25 p. c.	O	(O), partly transparent	(O)	Somewhat whitened	O	O
Ammonia, strong	O	Less brilliant only	BECAME	Semitranspnt. white	O	Whitish
Sodic hydrate, 10 p. c.	O	(O), less brilliant	{ Six; much the same	White	O	Almost whitish
Number of other re- agents tried, and general result	O, some transparent			Fairly white	White	Dull and faded
				{ Ten; similar, } or less so	Nine; chiefly = O..	
	<i>Angerona prunaria</i>	<i>Hyria auroraria</i>	<i>Abrazas grossulariata</i>	<i>Xanthia silago</i>	<i>Triphena pronuba</i>	<i>Helica tenabrata</i>
Hydrochl. acid, strong	O	BECAME	BECAME	BECAME	BECAME	BECAME
Nitric acid, 50 per c.	Dull brown-yellow	Some whitish, some O	Fading somewhat	(O)	O	O
Sulphuric acid	Dull brown-yellow	Whitish	Almost white	O	O	
Acetic acid, strong	O	Dull white instantly	Yellow-white	O	O	
Potass. hydrate, 25 p. c.	Dull brown-yellow	O	O	O	O	O
Ammonia, strong	Less deep and bright	O	Gone; white	Only duller	O	
Sodic hydrate, 10 p. c.	Whitish yellow, very [faded]	Dull yellowish whitish	Fading towards white	O	Very faded towards whitish	
Number of other re- agents tried, and general result			Almost white	Dull and little faded	O	
			{ Nine or ten; } results, = O		Nine; results, = O	

COLOUR = $\left. \begin{array}{l} \text{RED} \\ \text{(AND PINK)} \end{array} \right\} \text{ IN}$		Vanessa atalanta	Van. cardui (below)	Parnassius apollo	Papilio machaon	Smerinthus ocellatus	Zygana filipendulae
REAGENT		BECAME	BECAME	BECAME	BECAME	BECAME	BECAME
Hydrochl. acid, strong		Dull "cardui" brown	Faded to whitish ..	Orange	Little browner only	Yellowish (at once) ..	Bright orange
Nitric acid, 50 per c.		Fawn or yellow-brown	Ditto	Pale orangeish ..	.....	Yellowish to white ..	Yellow to orange
Sulphuric acid		"cardui" brown....	Some ditto	Reddish orange ..	.....	Brownish yellow....	Brown-orange
Acetic acid, strong ..		O .....	.....	O .....	.....	O	O
Potas. hydrate, 25 p. c.		Faded "cardui" brn.	Faded to whitish ..	Red-orange (by NaHO	Brown	Yellowish brn. at once	Partly gone; trans-
Ammonia, strong ..		Rather faded ditto ..	Ditto	(O) [35 per cent.]	.....	Pinkish brn., very pecu-	O [parential
Sodic hydrate, 10 p. c.		Yellow-brown .....	.....	.....	.....	Brownish yel. [lar col.]	Faded reddish
Number, and effect, } of other reagents }		Ten; chiefly = O ..	.....	.....	{ Not a true red at }	.....	{ Twelve; nearly all }
					{ at all, evidently }		{ = orange }
		Arctia cata	Euchelia jacobaeae	Hepialus humuli, ♀	Catocala nupta	Xanthia silago	
		BECAME	BECAME	BECAME	BECAME	BECAME	
Hydrochl. acid, strong		Orange at once	Orange-yellow at once	Gone { Leaving	Orange-yellow at once	Yellow at once	
Nitric acid, 50 per c.		Orange to yellow ..	Lem.-yel. (deepening)	Gone { faint orange	Ditto	Ditto	
Sulphuric acid		Orange at once	Almost O ... [at once	Gone { marking	Orange-yel. (not all)	(Brownish) & fainter	
Acetic acid, strong ..		O*	O	((O))	Slightly orange....	Browner	
Potas. hydrate, 25 p. c.		Transpt. orangeish..	Very faded, no yellow	Faint orangeish ...	Faded red-orange ..	Duller and browner	
Ammonia, strong ..		Only less brilliant*	Very faded indeed, red	O	Orange (not all)	Only duller	
Sodic hydrate, 10 p. c.		Only dull flesh	Only faded red ....	.....	Faded flesh	Dull, and little faded	
Number, and effect, } of other reagents }		Eight or nine; some } orange, &c., some O }	Nine; chiefly O, or slight	{ Six; similar; a most unsatis- factory colour }	Eight; chiefly orange or so		
		Hygia auroraria	Acidalia rubricata			Deilephila lineata	Deiopeia bella
		BECAME	BECAME			BECAME	BECAME
Hydrochl. acid, strong		Yellow instantly, then	Peculiar dunnish in-			Faded yellowy whitish	Dull ashyish yellowish †
Nitric acid, 50 per c.		Ditto	Ditto [stantly			Ditto	Brightish yellow at once
Sulphuric acid		Dull white instantly	Ditto .....			.....	Yellow
Acetic acid, strong ..		(O)	Brownish [stantly			.....	O (trifle faded)
Potas. hydrate, 25 p. c.		Dull yellowish	Peculiar dunnish in-			.....	Some left; some gone
Ammonia, strong ..		O	Brown-dunish ..			.....	(O)
Sodic hydrate, 10 p. c.		Dull yellowish whitish	Peculiar dunnish in-			.....	(O)
Number, and effect, } of other reagents }			[stantly				

** These two experiments were made on *C. hera*; not on *A. catia*.

† This was final result. Wing went yellow instantly on adding the acid; then changed to above.

COLOUR =) IN
CHESTNUT;

REAGENT	Vanessa io (unique)	V. antiopa (unique)	V. cardui	V. urticae	Argynnis paphia	Melipotis athalia
	BECAME	BECAME	BECAME	BECAME	BECAME	BECAME
Hydrochl. acid, strong	Gone; blackish	Dissolved out; black-	Only slightly faded	Whitish	Faded; dirty whitish	
Nitric acid, 50 per c.	Gone; lightish	Ditto; but less [ish	Little faded.....	Whitish } dissolved	O	Yellowed; little
Sulphuric acid	Gone; blackish	.....	Chiefly dissolved out	Dissolved out.....	((O))	(fading
Acetic acid, strong..	(O) .....	.....	O	Partly gone; faded..	((O))	
Potas. hydrate, 25 p. c.	Quite dissolved out..	Gone; black	Faded whitey-brown	Quite gone; brownish	Faded to whitish ..	Much faded; yellow-
Ammonia, strong ..	Mostly ditto (left blk.)	.....	Chiefly gone; whitish	Quite gone } white	Faded to whitish ..	(ish
Sodic hydrate, 10 p. c.	Ditto (left black)....	.....	Quite faded; whitish	Quite gone; white ..	Very faded brown ..	Much faded; yellow-
Number, and effect, of other reagents	Twelve; some O, some same .....	.....	{ Fifteen; similar, and O	Fourteen; similar, more or less, By silver nitrate, darker	Fifteen; similar, but weaker; and O, by borio acid, very faded	(ish
	<i>Epinephile titlanius</i>	<i>E. janira</i>	<i>Satyrus negetra</i>		<i>Ctenonym. pumphila</i>	<i>Polyommatus phleas</i>
	BECAME	BECAME	BECAME		BECAME	BECAME
Hydrochl. acid, strong	Partly faded	Altered and faded ..	Only little faded....		Dirty brownish white	Chiefly faded
Nitric acid, 50 per c.	Trifle faded	Very faded indeed ..	Partly faded		Dirty whitish	None gone
Sulphuric acid	Little faded +	Altered and faded ..	Trifle reddened		Faded	Faded; much gone
Acetic acid, strong..	Little faded? .....	.....	O		Peculiar; faded? ..	Almost O
Potas. hydrate, 25 p. c.	Faded; brown white	(A colourless grey-	Faded moderately ..		Quite white	Whitish; entirely
Ammonia, strong ..	Little faded	ish; no doubt	Not much faded		Very faint yellowish	Ditto ditto [faded
Sodic hydrate, 10 p. c.	Faded-brown	dissolved	Not much faded		Quite white	Ditto ditto
Number, and effect, of other reagents	Fourteen; similar, and O. By phenol, much faded	.....	{ Fourteen; chiefly O. By phenol, faded yellowish white		{ Fourteen; chiefly "fading"	Fifteen; some alimi- lar; none = O
	<i>P. virgaurea</i>	<i>Hesperia sybanus</i>	<i>Limnitis sibylla</i> (below)	<i>Danae chrysippus</i>	<i>Argynnis selenis</i>	
	BECAME	BECAME	BECAME	BECAME	BECAME	
Hydrochl. acid, strong	Much dissolved out +	.....	Darkish grey-dun ..	(Dissolved out)	Chiefly dissolved;	faded brownish white
Nitric acid, 50 per c.	Moreso; faded brownish	.....	Much dulled	to very	Faded; partly dissd.	
Sulphuric acid	Partially dissolved out	Faded	Dark dun	considerable	Same as first	
Acetic acid, strong ..	Only little affected..	Somewhat faded....	Towards dun	extent	Somewhat faded	
Potas. hydrate, 25 p. c.	Whitish; completely dis.	Dissolved; white ..	.....	Entirely dissolved;	Dissd.; almost white	
Ammonia, strong ..	(Whitish; practically	Ditto; almost white	Grey-dun	whitish grey, i. e.,	Much dissolved; faded	yellow-brown
Sodic hydrate, 10 p. c.	completely dissold.)	Dissolved; white ..	.....	membrane colour)	Dissd.; almost white	

GREEN		I. globularia			
REAGENT		BECAME	BECAME	BECAME	BECAME
Hydrochl. acid, strong	Bronze-brown in-	Brown, instantly ..	Brown	Very pale greenish white	Larentia viridaria (pectinaria)
Nitric acid, 50 per c.	Ditto [standly	Brown, instantly ..	Brown	Ditto yellowish white	
Sulphuric acid	Ditto	Brown, instantly ..	Bronze-brown	(O)	
Acetic acid, strong..	O (or trifle bronzeish)	Brown, instantly ..	Slightly reddish brn.	Nearly white via yel-	
Potas. hydrate, 25 p. c.	Bronze-brown	Bronze-brown	Bronze-brown	OCHRE-YELLOW	
Ammonia, strong ..	Bronze-brown	Brown	Bronze-brown	Nearly white	Cidaria miata and C. pectinata
Sodic hydrate, 10 p. c.	Bronze-brown	Brown; finally pale	.....	
Number, and effect,	lar; whitish brown	[dun			
of other reagents	in one case				
	Mona orion	Dichonia apitina			
	BECAME	BECAME			BECAME
Hydrochl. acid, strong	White; faint grn. tint	White, instantly		Brownish grey, instly.	
Nitric acid, 50 per c.	Yellow-creamish ..	Faint yellowish green-		Yellowish brn., instly.	
Sulphuric acid	White; faint grn. tint	O [ish white		Some greyish, some	
Acetic acid, strong..	White	About whitish		(O)	
Potas. hydrate, 25 p. c.	White; faint crm. tint	O		Duller & lighter only	Euchloe cardamines
Ammonia, strong ..	White; faint grn. tint	O (O)		O	
Sodic hydrate, 10 p. c.	.....	O		O
Number, and effect, {					
of other reagents }					
	Nemoria vernaria	Hemithea strigata		Tortrix viridana	BECAME
	BECAME	BECAME			
Hydrochl. acid, strong	White (vis pale rose)	White (to cream) ..	White	Greenish white	
Nitric acid, 50 per c.	White; rapid change	.....	Faint yellowish white	Brownish white, in-
Sulphuric acid	White; ditto .....	.....	Pure white	Dirtyish white [standly
Gulphuric acid, strong..	White; * ditto	White	Pure white	Gone; transparent..	Black O Black Black Black Black
Potas. hydrate, 25 p. c.	White	Yellowish white	Ditto; partly transpt.	Semitranspt.; white	
Ammonia, strong ..	(O) .....	.....	Nearly white [white	Slightly greenish wht.
Sodic hydrate, 10 p. c.	.....	.....	Pale yellowish greenish	Very faded; still green
Number, and effect, {	.....	{ Phenol turned this	.....	Ten; chiefly O
of other reagents }	yellowish		

* Passing through phase with pale yellow streak.

COLOUR = }
BLUE

REAGENT	IN	Papilio machaon	Vanessa atalanta and <i>V. urticae</i>	<i>V. io</i> (ocelli)	<i>V. io</i> (spot on forewing)	<i>V. antiopa</i>	<i>V. atalanta</i> (below)
		BECAME	BECAME	BECAME	BECAME	BECAME	BECAME
Hydrochl. acid, strong		((O)); greyer	(O)	Lighter, but left....	Paler blue	Destroyed	Whitish
Nitric acid, 50 per c.		Gone; greyish traces	O	Chiefly destroyed;	Pale	Destroyed	Faint whitish traces
Sulphuric acid		Pale greyish	(O)	Ditto [rest pale	Very pale bluish....	Destroyed	Very pale (only
Acetic acid, strong..		Gone; greyish traces	O	Left, though paler..	Very pale blue	(Destroyed)	Pale misty bluish
Potas. hydrate, 25 p. c.		Gone; greyish traces	O	O	Quite destroyed	O	(O)
Ammonia, strong ..		Pale greyish; returned	O	Lighter, but left....	Very pale blue	O	Paler greenish blue
Sodic hydrate, 10 p. c.		Gryish traces (on drying	O	Left, but less brilliant	Whitish	Destroyed	
Number, and effect, } of other reagents)		(Five; results = O; a difficult and un- satisfactory colour	Six; results = O. Hind ocellus is the more stable			
		<i>Apatura iris</i>	<i>Limen. sibylla</i> (below)		<i>Lycena alexis</i> , ♂	<i>L. adonis</i> , ♂	<i>L. corydon</i> , ♂
		BECAME	BECAME		BECAME	BECAME	BECAME
Hydrochl. acid, strong		O	Dull greyish		Slatish grey, at once	Slate-grey	Slate-grey
Nitric acid, 50 per c.		O	Gone		Brownish slate, ditto	Gone; indescribable	Slatish
Sulphuric acid		O	Greyer than at first		Blackish [tinge	Dark slate	Slate-grey (blue gone
Acetic acid, strong..		O	((O))		Chiefly gone; green	Blackish	Indescribable result;
Potas. hydrate, 25 p. c.		Gloss and brilliancy	Gone.....		Faded <i>corydon</i> tint..	.....	Indefinite; some left
Ammonia, strong ..		O [quite gone	Grey; some O.....		Less violet; more	Greenish	Slate-grey
Sodic hydrate, 10 p. c.		(O)	Destryd. (or greyish?)		GREEN tint [" <i>adonis</i> "	Dull greenish	Faint slate-grey
Number, and effect, } of other reagents)			(Fourteen; several peculiar indescrib- able effects	Seven; various. By oxalic acid, blue, with green tint	Eight; similar
		<i>Lycena semiargus</i>				<i>Smerinthus ocellatus</i>	<i>Catocala fraxini</i>
		BECAME				BECAME	BECAME
Hydrochl. acid, strong		Similar to very rubbed				(Greyish)	O
Nitric acid, 50 per c.		Destroyed (greyish)	<i>corydon</i>			.....	More ashy, &c.
Sulphuric acid		Towards <i>corydon</i> ..				Dulled	((O))
Acetic acid, strong..		Ditto				O; or little duller ..	(O)
Potas. hydrate, 25 p. c.		Chiefly gone; bluish				Dulled towards slatish	(O)
Ammonia, strong ..		O				O [(by sodic hydrate)	O
Sodic hydrate, 10 p. c.		<i>Corydon</i> , with green				Very indadnite; seems	Sickly; seemed gone
Number, and effect, } of other		(tint				[destroyed	

DESCRIPTIONS OF TWO NEW SPECIES OF PHYTOPHAGOUS COLEOPTERA FROM THE EAST.

BY MARTIN JACOBY, F.E.S.

CHRYSOMELA BELLA, n. sp.

More or less elongate, metallic cupreous, varied with blue or green; thorax deeply punctured near the lateral margin, the latter scarcely thickened, the basal margin, a narrow middle line and lateral spot, blue; elytra finely punctured, the suture and a band at the sides, violaceous blue. Length, $2\frac{1}{2}$ —4 lines.

Of rather elongate shape and resembling *Orina speciosissima*, but without the deep lateral thoracic depression of that species; the head sparingly and very finely punctured, with a central narrow groove, cupreous or metallic greenish, the base with a larger or smaller violaceous spot; palpi nearly black, the third and fourth joints equal, the last one truncate; antennæ extending a little beyond the base of the elytra, metallic dark violaceous, the lower six or seven joints shining, the rest opaque, pubescent, the third joint elongate, the others short, nearly equal, the terminal joints gradually thickened; thorax transverse, rather more than twice as broad as long, the sides nearly straight or very little rounded, the anterior margins straight at the middle, produced into a blunt point at the angles, the sides but slightly thickened with some irregularly distributed deep punctures, the rest of the surface finely (sometimes scarcely perceptibly) and closely punctured, metallic cupreous, a large spot at each side near the basal margin, the latter itself and a narrow central line, metallic violaceous; scutellum bluish; elytra finely punctured, the punctures arranged in rather close and irregular rows, which become indistinct towards the apex; the sutural margin narrowly and a broad sublateral stripe from the base to the apex, violaceous, the intermediate spaces, reddish cupreous; under side metallic green or blue, the breast and the margins of the abdominal segments, as well as the femora, more or less cupreous; the first joint of the anterior tarsi longer than the second one, all closely pubescent below; the male organ strongly curved, shallowly hollowed, the apex deeply excavated, the extremity slightly truncate.

Hab. Ichang, China (Pratt).

According to Mr. J. Weise, this species, of which many specimens were obtained, is the representative of a new genus, allied to *Melasoma*; in my opinion, however, the differences in the structural characters in the present insect are not sufficient to justify a separation from *Chrysomela*, the numerous species of which differ frequently to a similar degree.

SEPHARIA, Fairm.

I refer to this genus of Galerucidæ, described by Fairmaire in the 'French Annals,' 1889, an insect from Kaschmir, which seems to possess all the structural characters, as pointed out by M. Fairmaire. This author has, however, not mentioned the shape of the thorax, nor the length of the tarsi. I, therefore, add here that the thorax in the present species is transverse, more than twice as broad as long, and its disc obsoletely transversely depressed; the tibiæ are all armed with a distinct spine, and the first joint of the posterior tarsi is nearly half the length of the

tibia; the anterior coxal cavities are closed. *Sepharia*, on account of the long metatarsus of the posterior legs, seems allied to *Luperodes* and *Ochralea*; the shape of the thorax separates the genus from either; the closed cavities, from *Luperodes*; the broad, concave, and entire elytral epipleuræ distinguish *Sepharia* from *Monolepta*.

SEPHARIA FRONTALIS, n. sp.

Oblong-ovate, testaceous; the scutellum, a spot at the basal margin of the elytra, their extreme apex, the breast and sides of the abdominal segments, and a spot at the apex of the pygidium, black; thorax impunctate; elytra scarcely perceptibly punctured.

Mas.—Head with a deep excavation and a triangular black projection, the clypeus with two smaller depressions; the last abdominal segment trifid, the middle lobe slightly longitudinally concave. Length, 3 lines.

Of a pale testaceous colour, the head broader than long, the eyes prominent and large, the space between them excavated, the upper margin of the excavation fringed with hairs, the interior furnished with a triangular projecting black point; antennæ testaceous, two-thirds the length of the body, the first joint very elongate, curved and thickened towards the apex, the two following joints small, the fourth as long as the first, the following joints smaller, furnished with some stiff hairs; thorax narrowly transverse, the sides narrowly margined, slightly rounded and narrowed towards the base, the anterior margin straight, the angles not prominent, the surface obsoletely transversely depressed, not visibly punctured; scutellum triangular, black; elytra convex, but little widened posteriorly, the apex rather truncate, their epipleuræ broad, concave, continued to the apex, the surface extremely minutely punctured, testaceous, a narrow streak or spot (sometimes absent) is placed on the extreme basal margin near the shoulders, and another small spot at the extreme sutural apex; the breast, the sides of the abdominal segments, to a greater or smaller extent, and a spot at the apex of the pygidium, as well as one at the flanks of the thorax, black; legs long and slender, testaceous, the tibial spines black.

In the female the head is only obsoletely depressed between the eyes, and simple, as well as the last abdominal segment.

Several specimens obtained by Mr. Leech in Kaschmir.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

OCCURRENCE OF *PLUSIA MONETA* IN BRITAIN.—Mr. W. M. Christy informs me that he has lately taken a specimen of *Plusia moneta*, Fabr., in his moth-trap. The insect is now on the setting-board, but the fortunate captor has kindly promised to lend me the specimen to figure in the September number of 'The Entomologist.'—R. S.

A DAY AT TILGATE FOREST.—On Whit-Monday, May 26th, the South London Entomological and Natural History Society held their first field-day at Tilgate. Meeting at Three Bridges station, the line of route selected was almost parallel to the London and Brighton railway, passing through the Tile yard, Cinder Valley, on to Balcombe tunnel. This is, perhaps, the best collecting-ground of the district, being well wooded with oak, ash, beech, larch- and spruce-firs, alder, and birches, the lovely growth and foliage of the latter being at their best, and worth the journey

to see: you have miles and miles of birch, with an undergrowth of heather and fern, and here and there boggy splashes, all splendid collecting-ground, and producing many good and rare species. The spruce-firs produce *Eupithecia togata*, the larvæ being found feeding in the cones in the autumn; the birches yield *Notodonta carmelita*, *Endromis versicolor*, *Cerura bicusps*, *Notodonta dictæoides*, &c.; the beech, *Stauropus fagi*; the alder, *Sesia sphegiformis*, &c. To name all the good species that may be taken here by diligent working would indeed make a long list. Those of our party that arrived by the earlier morning train found Lepidoptera flying freely. *Pieris brassicæ*, *P. napi*, and *P. rapæ* all fairly common; *Anthocharis cardamines* were very numerous; hibernated *Vanessidæ* and tattered *Gonopteryx rhamni* scuttled hurriedly along; *Argynnis euphrosyne* in numbers; whilst a few *Syrichthus malvæ*, *Nisoniades tages*, and *Hesperia sylvanus* flitted about in the bright sunshine. The beating-stick applied to the alders dislodged a few *Hypsipetes impluviata* and *Eupisteria oblitterata* (*heparata*), with several commoner *Geometridæ*; whilst by a closer search at the alder stems, a few larvæ of *Sesia sphegiformis* were found feeding (it feeds for three years), but only two spun- and fed-up specimens were met with; evidently the species is by no means common. The two pupæ found produced two fine males on June 6th, and were the best captures of the day. *Venilia macularia* and *Fidonia atomaria* were in profusion, and a few pretty forms of either could be selected. *Zonosoma pendularia* and *Tephrosia punctulata* were fairly common on the tree stems, although less numerous than most years. The blue-bells and ferns in the Cinder Valley looked most charming, many white varieties of the former (*Scilla nutans* var. *alba*) occurred; and by the side of the little stream, *Athyrium filix-femina* and *Lastrea æmula* (the hay-scented fern) grew in great luxuriance; and the variable *L. dilutata* was much in evidence. *Lomaria spicant* adorned every wet rill, and on the dryer ground, *Lastrea oreopteris* looked beautiful in its shuttlecock tuft, and profuse abundance. The delicate little ivy-leaved bell-flower, *Campanula hederacea*, in places carpeted the ground, although not quite in flower; and in one spot masses of the stag's-horn moss, *Lycopodium clavatum*, grew amongst the *Sphagnum* and heather. By four o'clock our party (fourteen) found that the inner-man required recuperating, so tracks were made for the 'Norfolk Arms.' An *alfresco* wash from the cool water of the old well and a light tea refreshed us all for our return through the forest. Unfortunately, as the sun went down the cold north-east wind quite stopped any evening flight, so that our captures were not much augmented,—a few *Tortrices*, *Eupitheciæ*, and *Eudoriæ*; but nothing of much consequence. Our attention was diverted to the twisted-up leaves for larvæ. *Asphalia flavicornis*, *Cheimatobia boreata* and *Phycis betula* were fairly common on the birch, although much less so than some years; and a few *Tethea reclusa* larvæ were found neatly spun-up in the top shoots of willows. Although during our ramble we had made no specially rare captures, the day was thoroughly enjoyed by all.—W. H. TUGWELL; June 23, 1890.

JUNE OUTING OF THE S. LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—On the 21st of June about twenty members of this Society and their friends went by train to Leatherhead, where they were met by Mr. C. A. Briggs and his brother Mr. T. H. Briggs. The former gentleman kindly conducted the party to Mickleham. After a sharp walk through the town, and a pleasant jog-trot along the lanes and over the Downs, a convenient halting-place was reached about 4.45 p.m. Here the party

was broken up, the members wandering away singly, or in twos and threes, to collect what they would or could for the space of one hour by the clock. All appeared to have made good use of their sixty minutes; and if some had not made many captures, they had at least travelled far, as it was something beyond the appointed time ere the last straggler had reached the rendezvous. Mr. Billups was busy among the Diptera, &c. (see list below), and the Lepidopterists had some sport with *Setina irrorella*, *Acidalia ornata*, and the usual *pot-pourri* of the "hilly field" at this season of the year, comprising various Pterophoridae, Crambidae, and Tortricides. The members being again assembled Mr. Briggs resumed command, and marched them back to Leatherhead, where he most hospitably entertained the whole party at his house.

At the meeting of the above Society held on the 26th of last month Mr. Billups exhibited types of the insects taken at Mickleham by himself; and although, as previously stated, the actual working time was limited to some sixty minutes, still Mr. Billups managed to get a considerable number of insects of many Orders together; and to show what may be accomplished with a little energy, in a comparatively short time, it may not be uninteresting to enumerate some of the captures. Diptera was the most largely represented Order, there being twenty-nine species, consisting of the following:—*Scatopse notata*, L.; *Dilophus febrilis*, L.; *Bibio marci*, L., and *johannis*, L.; *Simulium reptans*, L.; one species of *Chironomus*, not determined; *Pachyrrhina crocata*, L.; *Tipula oleracea*, L.; *Pachygaster leachii*, Curt.; *Nemotelus nigrinus*, Flin.; *Beris clavipes*, L., and *chalybeata*, Foerst.; *Hematopota pluvialis*, L.; *Chrysops cæcutiens*, L.; *Leptis scolopacea*, L.; *Leptogaster cylindricus*, Deg.; *Dioctria rufipes*, Deg., and *baumhaueri*, Mg.; *Dysmachius trigonus*, Mg.; *Rhamphomyia sulcata*, Flin.; *Empis tessellata*, F., and *livida*, L.; *Dolichopus æneus*, Deg.; *Leucozona lucorum*, L.; *Conops vitellinus*, Lw.; *Tetanocera punctulata*, Scop.; *Platystoma seminationis*, F.; *Acidia heraclei*, L.; and *Spilographa zoë*, Mg. Hymenoptera, twenty-three species, among which were types of the following sub-families:—Three species of Diploptera, namely *Odynerus parietum*, L.; *Prosopis communis*, Nyl.; and *Nomada alternata*, Kirby: the Ichneumonidae having ten representatives, i.e. *Chasmodon motorius*, Fab.; *Ichneumon vaginatorius*, Lin., *I. luctatorius*, L., and *I. latrator*, Fab.; *Colpognathus celerator*, Gr.; *Dicælotus pumilus*, Gr.; *Phæogenes planifrons*, Gr., and *fulvitaris*, Gr.; *Hemiteles bicolorinus*, Gr.; and *Pezomachus distinctus*, Först.: while *Proctotrypes ater*, Hal., *Codrus apterogynus*, Hal., *Lagnodes pallidus*, Först., and *Chelogynus lapponicus*, Hal., filled a gap in the Oxyuradæ: *Callinome regius*, Ns., and *Syntonaspis caudata*, Ns., were the only species of Chalcididae obtained; while *Rhodites rosa*, L., and *R. eglanteria*, Hartig, represented the gall-makers, or Cynipidae. Two species of sawfly, or Tenthredinidae:—*Lophorus pini*, L., and *Hylo toma cyanea-crocea*, Cam., bringing up the balance of Hymenoptera. Only five species of Coleoptera were taken, these being—*Scaphisoma agarinum*, Ol.; *Cistela murina*, L.; *Edemera lurida*, Marsh.; *Magdalinus aterrima*, L.; and *Clytus arietis*, L. Hemiptera had three representatives, in *Pantilus tunicatus*, Fab.; the not common *Stiphrosoma leucocephalum*, L.; *Plagiognathus arbustorum*, Fab. *Philænus exclamationis*, Thunb., being the only species of Homoptera; one solitary species also represented the Neuroptera, *Stenopocus cruciatus*, L. In all 104 insects were captured by Mr. Billups, representing 10 families: in addition to which there were

three species of Arachnida—*Marpera nervosa*, Clerck; *Dysdera cambridgii*, Thor.; and *Nemastoma bimaculata*, Meig.

A DAY IN HERTFORDSHIRE.—The Metropolitan Railway extension to Chesham affords a convenient means of reaching some very excellent collecting-ground in Hertfordshire and Buckinghamshire. Since this line has been opened I have explored the country around the two stations between Rickmansworth and Chesham. Although, so far, I have not been able to properly investigate its entomological fauna, I am satisfied that the whole district is one which would well repay careful work, and, considered from a collector's point of view, may be regarded as a land of promise. The following notes refer to the Rickmansworth section:—During an autumn stroll in the direction of Harefield, I last year took a good number of the larvæ of *Eupithecia albipunctata* from off flowers and seeds of *Angelica sylvestris*. On the 28th of May, of this year, I made the same journey, accompanied by Mr. R. W. Thompson. We commenced work by searching for ova of *Euchloë cardamines*, and by close and careful examination of the flowers of *Cardamine pratensis*, and another member of the Cruciferæ of whose name I am unfortunately ignorant, we found the little orange eggs singly here and there. By the time we had tired ourselves with this back-aching amusement we had obtained a fair number of ova. We next tried our luck at beating the herbage for larvæ, but the only species obtained in any quantity was *Cidaria dotata* (= *pyraliata*) from *Gulium*. The larva of *Plusia chrysis* being a desideratum, we paid particular attention to likely-looking patches of nettles, but only obtained four *chrysis* and two *iota*,—a poor return, certainly, for the amount of energy put into the work; so we determined to cease operations until we arrived on the heath across which the road we were following would pass, and where we hoped to find plenty of occupation. The first moth to engage our attention on reaching the heath was *Stigmonota internana*; hundreds of these pretty little insects were flying about the furze bushes in company with *Catoptria ulicetana*. Farther on an occasional *Eupæcilia maculosana* was netted as we passed near some wild hyacinths. An attack was then made on the trees for larvæ, but the beating-stick failed to persuade anything better than *Phigalia pedaria*, *Oporabia dilutata*, and *Hybernia defoliaria* to drop into the umbrella. Searching rewarded us with larvæ of *Tethea subtusa* between leaves of white poplar; *T. retusa*, on willow; *Phycis betulæ*, in a web at the ends of birch twigs; and *Padisca ophthalmicana*, on white poplar. After leaving the heath we noticed some yellow rattle (*Rhinanthus crista-galli*) in a grass meadow: as there was a convenient footpath through this field, we entered, and were pleased to find *Emmelesia albulata* just out, and in some abundance; some pretty forms were secured. One or two examples of *Heliaca tenebrata* (= *arbuti*) were also observed. Altogether very few imagines came under our notice during the morning, but, in addition to those already mentioned, we saw *Venilia macularia*, *Panagra petrarica*, and *Melanippæ sociata*. Towards evening, when we returned to the heath, the last-named species appeared in considerable numbers, and, at the same time, odd specimens of *Emmelesia decolorata*, *E. affinitata*, and *Coremia unidentaria*, were captured, as also were single examples of *Argyrolepis hartmanniana* (= *baumanniana*) and *Catoptria albersana*. As the light waned we packed up our traps and turned towards Rickmansworth. At one time we were disposed to think that we had been unwise in not providing ourselves with lamps and sugar; but after sunset there was a

sudden decrease in the temperature, and scarcely an insect to be seen on the wing, so we consoled ourselves with the philosophical reflection that we were not losing much by our omission.—RICHARD SOUTH.

A WEEK IN THE NEW FOREST.—Although the season is not as yet very far advanced, a few notes on the result of a week's collecting at Lyndhurst may perhaps be of interest to those readers of 'The Entomologist' who intend to work the New Forest later in the summer. I arrived at Lyndhurst on June 21st, and immediately called upon a well-known local entomologist of great experience. His report was not encouraging, and, unfortunately, was fully borne out by my subsequent experience. After a futile night's sugaring, and a day's rest on the Sunday, I began work in earnest on the 23rd. The weather was very hot, but the sky was thickly clouded over all day, and in consequence everything had to be beaten up. The only insects which put in an appearance were *Argynnis seleno* on the heaths, and the ubiquitous *Epinephela ianira*, whose mission in life seems to be to "come out strong" under depressing circumstances. However, by hard work at beating, I managed to secure by one o'clock some fine *Metrocampa margaritaria*, *Boarmia repandata* (including some pretty varieties), *Bapta taminata*, *Pararge egeria*, *Eubolia plumbaria* (*palumbaria*), *Ephyra linearia* (*trilinearia*), and a beautiful pair of *Drepana falcata* (*falcula*), which were taken from birch. I afterwards worked the heath, and got *Nemeophila russula* in fine condition, *Bupalus piniaria* (the latter was very abundant), *Macaria liturata*, and other common things. The evening work was, as usual, a complete failure. On the 24th I was joined by a friend, but, though we worked the woods and heaths hard, we were only rewarded with *N. russula*, *Gonepteryx rhamni*, (very battered in nearly every instance), some clouded varieties of *Boarmia repandata*, *B. piniaria*, a pair of *Hepialus hectus*, and other insignificant captures, up till the 27th. All this time sugaring proved absolutely fruitless, the mixture seeming to be far more attractive to sundry slugs, of vast bulk and forbidding appearance, than to Noctuae. On the 27th we tried larva beating, in the absence of all imagines, but with no result worth recording. At last we were favoured with a gleam of sunshine, and saw *Argynnis paphia*, evidently only just out, one *Thecla rubi*, a few *Lycæna icarus* (*alexis*) and *ægon*, and *Cenonympha pamphilus*, as well as the usual swarms of *P. egeria*, *B. piniaria*, &c. I also got one *Drepana lacertula*, in fine condition, close to the spot where I had previously taken *D. falcula*. In the evening a few moths came to sugar, including *Aplecta nebulosa*, *Thyatira batis*, and *Noctua brunnea*. This was the wind-up to our visit, and we left next morning. I attribute our failure to three chief causes—bad weather, a late season, and the scarcity of Lepidoptera in general. For the most part the Sun refused to show himself, and the weather was ungenial. The fact that on our last day's excursion we found more variety in the species taken, coupled with the first appearance of Noctuae at sugar, induces me to think that we should have done better a week or ten days later. Still it was only too painfully apparent that there was a deplorable dearth of Lepidoptera. Other orders of insects were largely represented, the flies in particular, to an extent which rendered them very troublesome; while the Stag Beetle by night, and *Libellula splendens* by day, literally swarmed. An ominous fact was the absolute dearth of Diurni, even of the commonest kinds, and *Limenitis sibylla* did not cross our path at all, though it should certainly have been out during the latter days of our stay. I believe a solitary

specimen actually was seen, but not taken, by an entomologist staying in the village. On comparing notes with him I found that, badly as we had fared, his bag was still scantier, and all the resident collectors with whom I conversed were unanimous as to the dearth of Lepidoptera this year.—E. G. ALDERSON; Worksop, Notts.

CAPTURES IN THE BRIGHTON DISTRICT.—With the primary object of obtaining specimens of *Agrotis cinerea* this year, I went down to Brighton on the 26th of May, and again on the 7th of June. On the first occasion I could only find one example of the particular insect I was in quest of, and this was a male specimen. The second expedition was attended with better success, as I found several pairs of the species, in splendid condition, sitting about on the Downs. I also captured a few more or less worn males, which were attracted to the light of my lamp. I may mention that the usually common species of *Pieris* appeared to be curiously rare, but *Euchloë cardamines* was neither more or less common than in other years when I have collected on the same ground. *Nemeobius lucina* and *Thecla rubi* were common on the 26th of May, but *Macroglossa fuciformis* and *M. bombyliiformis* were both very scarce on that date.—H. McARTHUR; 35, Averill Street, Fulham, S.W.

LEPIDOPTERA IN OXFORDSHIRE.—So far the season has been below the average, but some few species have been abundant. *Thecla rubi* appeared in abundance; so plentiful were they at the end of May that it would have been possible to have taken hundreds in a day. *Ino geryon* also was fairly plentiful. I captured about 200 specimens in a few evenings, and then left the remainder to breed. I failed to find this species on the hills attaining a height of 800 feet; but the lower slopes, especially the glades in beech woods, were the places for it. Among the butterflies plentiful this season have been *Argynnis euphrosyne*, *N. tages*, *S. malva (alveolus)*, *L. astrarche (agestis)*, *L. minima (alsus)*. *L. argiolus* appeared sparingly. The July Fritillaries have not yet put in an appearance, owing probably to the wet weather. I caught over 200 *N. plantaginis* last week. This species is also very local, and frequents one wood only; searching in other woods proved a failure. In its particular haunts, however, it was a grand sight to see any number at the same time on the wing, and I am sure I do not exaggerate when I state that some thousands must have been hatched this year in that locality.—A. J. SPILLER; Chinnor, Oxon, July 3, 1890.

ABNORMAL EPINEPHELE IANIRA.—I see that Mr. Pearce, in his "Contributions to the Entomology of the Portsmouth District" (Entom. 230), says of *Epinephele ianira*:—"I have a very curious male, taken on Portsdown Hill in 1888; the right upper wing appears to have been tied round the centre in some way whilst developing." About a fortnight ago, on the 5th of this month, I captured a male of this species in Enfield, with the right upper wing wrinkled up round the centre in precisely the same manner. It was unable to fly much but kept on fluttering along in the grass, which drew my attention to it.—H. D. SYKES; "The Cedars," Enfield, July 19, 1890.

NOTE ON THE LIFE-HISTORY OF *BOMBYX QUERCUS* v. *CALLUNÆ*.—A few observations concerning the life-history of this species may be interesting to entomologists. On August 15th, last year, a female was captured at rest, which deposited a large batch of ova. After hatching

the larvæ were divided into four portions, three of which I gave to my friends, reserving the fourth for myself. Number 1 batch was kept in the living room all throughout their metamorphoses, and were fed on crab until September, when bramble was given. Growing rapidly, they attained their full growth and commenced to spin up at Christmas, the first imago (a female) appearing on July 1st, and one or more every day up to the time of writing. No. 2 batch were treated in a similar way to No. 1, but kept in the cellar of the house: this lot did not actually hibernate, as my friend told me that, when giving them fresh food (bramble), he found them crawling about; they commenced to prepare their cocoons May 27th, and up to the time of writing no imago had emerged. No. 3 batch were treated in a similar manner to No. 2, but, owing to some cause or other (probably damp), died off one by one. No. 4 batch (my own) were kept in a kind of shed sheltered from rain, and fed on crab up to the end of September; the crab then failing, the larvæ were placed out of doors, in a large cage specially prepared for them, with a good growing plant of bramble: they were examined from time to time, and it was noted that they only partially hibernated; they appeared to eat very little, and became a trifle smaller. The last winter, being very mild, not one died. About the middle of March I took them out of the cage, and placed them in the shed. When placed out for the winter they were about $1\frac{1}{2}$ in. long, and, although they had not grown during the winter, they were very lively, and to all appearance healthy. When the weather got warmer, and hawthorn and crab came into leaf, they were supplied with these, as well as bramble; the majority grew rapidly, attaining their full growth, and spun up by June 1st. The others are still feeding, and I do not expect they will pupate much before August, the usual time in a perfectly natural condition.—JOHN N. YOUNG; 85, Filey Road, Rotherham, July 3, 1890.

EUPITHECIA TOGATA, E. VENOSATA, AND EMMELESIA ALBULATA, TWO YEARS IN PUPA.—I have been breeding imagines of *Eupithecia togata* and *E. venosata*, also *Emmelesia albulata*, which were collected in Shetland as larvæ by the Messrs. Salvage in 1888, and have thus been two years in pupa. The first to emerge was *E. venosata*, on May 5th; *E. togata* made its appearance on May 19th; and the first *E. albulata* showed itself on June 17th. I can corroborate Mr. South's observations, in his interesting note on *E. togata* in 'The Entomologist' (No. 325, p. 205), as to the discrepancy in size, and colours, and markings of this species. One specimen which I have measures *very little over* half an inch, my largest insects being just an inch. Several had bright, claret-coloured bands when alive, fading in tint considerably after death. One specimen—my largest—has a broad, and dark red, band along the outer margins of both the fore and hind wings, making the white zigzag line more than ordinarily conspicuous. In some specimens there is scarcely any indication of this band. Kirby gives the following as a distinction between *E. abietaria* (Göze) and *E. togata* (Hübner). He says *E. togata* is "most readily distinguished by its much shorter palpi, which are only a little longer than the head." There is a difference in the length of these organs in my specimens; but I could not pretend to separate them myself by this character.—JOSEPH ANDERSON, JUN. (Chichester).

A PLAGUE OF CATERpillars.—A correspondent states that it is many years since the fruit trees of Cheshire were so seriously damaged by cater-

pillars. In the Kelsall district there will be little fruit of any description, the apple, pear, and gooseberry trees especially being affected. The disappointment among market gardeners is all the keener, as there was a magnificent show of bloom. A serious plague of caterpillars has broken out in the rural districts around Southampton, doing immense damage to the fruit crops, which in many cases are totally destroyed.

[The above cutting, from a London weekly newspaper (May, 1890), is inserted here as it may thus come under the notice of entomologists residing in the districts mentioned, who will perhaps be good enough to give us further particulars.—ED.]

SMALL EXAMPLE OF *TEPHROSIA BIUNDULARIA*.—I have never seen an example of *T. crepuscularia* smaller than the one mentioned by Mr. T. B. Jefferys (Entom. 204); but my friend Mr. George Rose, of Barnsley, took a specimen of *T. biundularia* on a cottage window, near Barnsley, in June, 1887, that measures only *half an inch* from tip to tip. This insect was given to Mr. C. S. Gregson by Mr. Rose, and an account of it appeared in 'The Young Naturalist,' vol. viii., p. 181.—A. E. HALL; Norbury, Sheffield.

SATURNIA PAVONIA (= *CARPINI*) LARVA FEEDING ON OAK.—I had a pair of *Saturnia pavonia* emerge, and obtained about 150 eggs. Some forty of these proved fertile. As I was unable to obtain heath for the young larvæ I gave them bramble and oak together, but they would only eat the oak for the first fourteen days or so; at the end of the first fortnight they took to the bramble, and although I have offered them heath and oak several times since they will not touch it, but stick to the bramble, the flowers of which, when well open, they seem very partial to. The larvæ, at the present time about thirty in number, appear to have fed up very equally and to be quite healthy.—MARK H. WINKLEY; 9, Glen Eldon Road, Coventry Park, Streatham, July 10, 1890.

ACIDALIA RUSTICATA IN THE NORTH OF LONDON.—As this species seems to be of very local occurrence, it may be of some interest to the readers of 'The Entomologist' to mention that I took a specimen on Hampstead Heath in 1884. Unfortunately I was quite a beginner at the time, and consequently the specimen is not in such good condition as one could wish, being minus its abdomen: the wings, however, are not damaged in any way. I am afraid I cannot give the date of capture, as in those days I did not keep any regular diary. I see that Newman gives Darenth Wood and the Isle of Portland as the only localities for the species, and Stainton mentions only the Isle of Portland and Northfleet.—HENRY A. HILL; 132, Haverstock Hill, London, N.W.

LEPIDOPTERA ATTRACTED BY LIGHT AT SHEPHERD'S BUSH.—Although this has been to me a somewhat blank season, yet I have taken, for the first time in Shepherd's Bush, two good specimens of *Amphidasys betularia*, which flew into my bedroom on June 26th, attracted by the gaslight. I have also taken, through the same means, several specimens of *Euplexia lucipara*, in June; *Mamestra persicaria*, commonly; *Triphæna pronuba*, in July, fresh and beautifully marked; *Melanippe fluctuata*; *Agrotis corticea*, one specimen; and *Acronycta aceris*, with well-defined black wing rays. I might mention that the hedges in North Acton, near Twyford Abbey Lane, were alive with *Camptogramma bilineata* on Sunday evening, July 6th, varying in shade from pale yellow to dark brown.—CHAS. E. M. INCE; 11, St. Stephen's Avenue, Shepherd's Bush, W.

CAPTURES AT LIGHT: DEVONSHIRE.—I beg to report the capture here, at light, of *Acronyeta alni* on June 13th, and of *Dianthæcia albinacula* on June 15th. Both are perfect male specimens.—ALLAN NESBITT; Calverly, Seaton, Axminster.

TREATMENT OF PUPÆ DURING THE WINTER.—Can anyone advise me as to the best way of keeping pupæ alive through the winter? For my part I find the pupæ of many Lepidoptera a great deal harder to keep alive than the larvæ are to rear. I usually keep my pupæ in a wooden box or breeding-cage, with perforated zinc at the sides, upon some earth, with a layer of moss over them, and, for the sake of experiment, I have from time to time moistened some of the pupæ, others I have kept dry. The result of my experiments is that some pupæ—*e.g.* those of *Dicranura vinula*, *Smerinthus ocellatus*, *Phalera bucephala*—have nearly always duly produced imagines, under whatever conditions I may have kept them, and whether moist or dry. On the other hand, others—*e.g.* *S. populi*, and various kinds of Noctuæ and Geometræ—have nearly always died. I have consulted the Rev. J. Greene's 'Insect Hunter's Companion,' and find that he advises not moistening them; but I cannot account for the fact that scores of pupæ of various kinds, including many of the genus *Taniocampa* that I dug up last autumn, all died in the spring, although I had not moistened them. I opened some of them when the moths were about three weeks overdue, and found the imago perfectly formed, but dead and dried up. I have now, amongst other larvæ, about fifty of *Notodonta trepida* and three of *N. chaonia*, all of which I have reared from the egg, and they are perfectly healthy. I shall be extremely disappointed if I fail to get these through to the perfect state.—T. H. WOLLEY DOD; Wellington College, Wokingham.

CAPTURES AT SALLOWS IN IRELAND.—During the last few days of March and the first two of April, I took the following species at sallows in Co. Donegal:—*Taniocampa gothica* and *T. stabilis*, several; *T. incerta*, 2; *Calocampa exoleta*, *Scopelosoma satellitia* and *Xylina socia* (= *petrificata*), a few specimens of each. *T. gothica*, *T. stabilis*, and *S. satellitia* also occurred at sugar, and were accompanied by *Cerastis vaccinii*. I do not see *X. socia* mentioned among the insects taken at sallows this year by your various correspondents (Entom. 200, 202, 234).—GEORGE HART; Woodside, Howth, Co. Dublin, June 23, 1890.

SESIA SPHEGIFORMIS IN ESSEX.—On June 16th I took a fine, freshly-emerged female of *S. sphegiformis* in Essex. It was quietly resting on an alder leaf.—J. A. COOPER; 1, Sussex Villas, Leytonstone, Essex.

CUCULLIA ABSINTHII AND ACIDALIA CONTIGUARIA NEAR BARMOUTH.—While staying at Arthog, near Barmouth, the first week in July, I took a specimen of *Cucullia absinthii*, which, I believe, has not been previously recorded from Wales. I also took one *Acidalia contiguaria*, which apparently is not recorded from anywhere else.—NEVILLE CHAMBERLAIN; Highbury, Moor Green, Birmingham.

SAPERDA CARCHARIAS AT CAMBRIDGE.—I have to note the capture of two specimens of *S. carcharias*, at Cambridge, during the later months of 1889. This species, I am told, only occurs in this neighbourhood, and has not, I believe, been taken at all recently.—F. A. HORT; 6, St. Peter's Terrace, Cambridge.

THE SUCCESSFUL MOTH-TRAP.—Having read Mr. Christy's interesting article on his moth-trap, I must say it seems to be very much like the American moth-trap; but I think the latter has an advantage in the drawer at bottom, as, by having this filled with fresh fine-cut laurel-leaves, the trapped insects are stupefied, if not killed; whereas without this the moths have full run of the trap. Another advantage I think rests with the American moth-trap—*i. e.*, Mr. Christy's trap allows the moth access to the portion κ to β . In the American trap this κ to β glass runs down into the trap, and joins the lamp protective glass at about figure g : thus the moths have no choice but to go downwards and inhale the poison. On the other hand the shadow partition, running from F up to the lamp-wick, is clearly an advantage, the moths below being nearly in darkness still I think, instead of the side-doors and shutters as in Mr. Christy's, a drawer should be added from D to c , running the whole size of bottom of trap. In this case it would not want the dark shutter of the American trap, but simply a deep drawer,—say $2\frac{1}{2}$ inches, quite plain, with $\frac{1}{2}$ -inch bed of chopped laurel-leaves at bottom. As Mr. Christy says, the wood warps, and causes the drawers and doors to fix; this is not so in the American trap, as it is all metal and glass only. I am not for one moment trying to run down Mr. Christy's trap in favour of the American, as I think that, with the drawer I mention and no side-doors, Mr. Christy's is even better than the American; but the addition of the poison-drawer is absolutely necessary to make it perfect.—EDWARD COOKE; 80, Museum Street, W.C.

LARVÆ OF TRIPHENA FIMBRIA.—For some years past it has been a puzzle to me why the mortality amongst the larvæ of *Triphena fimbria* should be so great. Last year I had a score or more of these larvæ, but I did not rear one imago. I believe that I have now solved the problem to some extent. This year, having collected a good number of the larvæ, I placed twenty in a cage by themselves; they all fed up well, and were down by the 20th of May. Contrary to my usual custom, I yesterday emptied the cage to examine the pupæ, and found five large cocoons of some ichneumon fly. Four of these I herewith send to you, and shall be glad if you can determine what they are.—JOHN M. YOUNG; Rotherham.

[The ichneumon is *Campoplex mixtus*, Grav.—T. R. B.]

PHIBALAPTERYX VITTATA AND AMPHIDASYS BETULARIA AT YEovil.—On the 12th instant a fine specimen of *Phibalapteryx vittata* (= *lignata*) came to light; and on the 22nd a large female *Amphidasys betularia* was picked up from the pavement near the centre of the town. Both are, I believe, new to the neighbourhood.—THOMAS PARMITER; 12, Camborne Grove, Yeovil, June 24, 1890.

STAUROPOUS FAGI NEAR READING.—On May 26th I took *Stauropus fagi* (female) in an old beech wood near Caversham. It was at rest on the trunk of a beech tree, some seven feet from the ground. I may add that one other specimen has been taken in the same wood this year, and one imago and one larva last year.—J. CLARKE: Carey Street, Reading, June 17, 1890.

DILOBA CÆRULEOCEPHALA FEEDING ON CHERRY LAUREL.—I have just had larvæ of *Diloba cæruleocephala* brought me, found feeding on cherry laurel; and as it seems to me a very unusual food for these larvæ, I should like to know if any of your readers have ever found them feeding on this shrub.—W. E. BUTLER; 297, Oxford Road, Reading, June 16, 1890.

HETEROGENEA (LIMACODES) ASELLA IN DEVON.—Whilst out beating for larvæ with a friend, on the afternoon of June 20th, in the Plym Valley, I was surprised to find in my umbrella a male and female of the above species *in cop.* According to Newman, Westwood and Humphrey, and Stainton's 'Manual,' this species has only been taken in Hampshire.* If this be still the case this species is new to the Western counties.—F. J. BRIGGS; Fursdon, Egg Buckland.

NOTE ON CRABRO INTERRUPTUS.—I am happy to say this wasp has again appeared in the garden here, driving holes in the old elm stump in which it took up its abode last year, and in another old elm stump about one hundred yards away. It is a curious sight to see the wasps carrying bluebottle flies, which seem to be their principal, or at any rate, favourite diet, into their borings. The fleshy parts of the bodies are the parts fed upon, and the wings and hard external parts are thrown out of the borings, and may be seen amongst the heap of wood-dust outside. Last year the *Crabro* was present in fair numbers about the latter end of August and September, and judging from the quantity of wood-dust now being thrown out in making the borings, I should think it will be plentiful again this year. I am in doubt whether the insects have one common nest, and whether the various borings converge on one point, or whether each *Crabro* and its family have their own habitation; but certainly more than one *Crabro*, even at this period of the year, enter the same hole, and there seems to be one principal entrance larger than the others; moreover they are using some of the holes made by their ancestors last year. Perhaps some of your correspondents acquainted with the insect's habits will kindly give me this information. From the report in the 'Entomologist' of last December of the Entomological Society's meeting, held on November 6th last, at which a specimen caught by me was exhibited, it would appear that the *Crabro* exhibited was a solitary specimen found by me in "a hole in a log;" but this is not so, as I merely caught the specimen exhibited for the purpose of having the species identified, and I could have captured a good many had I so desired.—FRANCIS C. WOODBRIDGE; "Old Bank" House, Uxbridge, July 17, 1890.

INO GERYON IN BERKSHIRE.—Amongst moths captured here, within the last few days, a male specimen of *Ino (Procris) geryon* has been taken; and a nearly full-grown larva of *Dasychira fascelina* was found on an oak.—J. M. BACON; Eagle House, Sandhurst, Berks, June 2, 1890.

SIREX GIGAS NEAR PLYMOUTH.—To-day I secured a fine female of the above species, which flew into a greenhouse in the garden here. I thought at first that it was a hornet, from the loud buzzing noise it made, but soon saw that I was mistaken. I had never previously taken or seen it here.—F. J. BRIGGS; Fursdon, Egg Buckland, June 22, 1890.

HESPERIA LINEOLA.—The third excursion of the South London Entomological and Natural History Society was to Leigh, in Essex, where, conducted by Mr. Carrington, the party, twenty in number, had a good time with *Hesperia lineola*, the newest English thing in the way of butterflies. The individual "takes" varied from twenty specimens to a single example. So far as I could learn there was only one gentleman who failed to secure the coveted species. Although he netted a good number of "skippers," they all proved, on inspection, to be *H. thaulas*.—R. S.

* [Stainton gives Lyndhurst and Worthing.—Ed.]

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*July 2nd, 1890.*—Prof. J. O. Westwood, M.A., F.L.S., Hon. Life-President, in the chair. Mr. J. B. Hodgkinson, Ashton-on-Ribble, Preston, Lancashire, and Mrs. Bazett, Springfield, Reading, were elected Fellows; and Mr. Henn was admitted into the Society. Lord Walsingham exhibited some rare Micro-Lepidoptera collected by himself at Cannes, including *Eudemis helichrysa*, *Conchylis rubricana*, Millière; a new *Depressaria* from *Opoanax cheironium*, which is about to be described by M. A. Constant, and *Bucculatrix helichrysellæ*; and also a volume of drawings of larvæ of the genus *Eupithecia*, by Mr. Buckler, which formerly belonged to the late Rev. H. Harpur Crewe. Mr. M'Lachlan exhibited larvæ and cocoons of *Mecyna deprivalis*, Walk., sent by Mr. W. W. Smith, of Ashburton, New Zealand; the species feeds commonly on *Genista capensis*, an introduced plant. Mr. M'Lachlan remarked on the curious nature of the larva, and suggested that as the species was so closely allied to *M. polygonalis*, so extremely rare in this country, they might be interesting to British lepidopterists. Mr. Jacoby exhibited abnormal specimens of a phytophagous beetle, *Metaxonychia tridentata*, Jac., in which one side of the thorax was furnished with teeth as in the type, whereas the other side was quite simple, and presented no trace of teeth. The Secretary, on behalf of Mr. J. Edwards, exhibited specimens of *Gyrinus colymbus*, Er., with specimens of *G. elongatus*, Aubé, for comparison; he also exhibited drawings of the cœdeagus of both species proving their distinctness. Mr. Bower exhibited *Phoxopteryx upupana*, bred from larvæ feeding between united birch leaves at Chiselhurst, Sept., 1889; and *Scardia picarella*, bred from fungus collected in Durham in May, 1870. Mr. S. Stevens, in speaking of a tour which he had lately made in Devonshire, remarked on the extreme scarcity of insects on the coast of that county as compared with the coasts of Kent and Sussex; there were very few larvæ, and the vegetation was very luxuriant and very little eaten; he thought it possible that the reason of the scarcity was the heavy rainfall of South Devon, which washed off and destroyed the young larvæ. Mr. Barrett said that his experience had been the same, and that he put it down to the violence of the winds, which beat the insects from the trees. Mr. Blandford remarked that he had found Coleoptera abundant on the Braunton Burrows, near Barnstaple, but very scarce in other localities. Mr. Mason and others took part in the discussion which followed. Mr. Stevens further said that when at Exeter he visited the Museum, and was pleased to see the original specimen of *Plusia ni* in the late Mr. H. Dorville's collection, taken at Alphington, near Exeter, in August, 1868, and a specimen of *Callimorpha hera*, taken also at Alphington in August, 1871, which is about six miles from the locality in which the latter insect is now said to occur; both the specimens are in fine condition. Prof. Westwood read a paper on a species of *Aphis*, received from Mr. E. Ernest Green, of Ceylon, affecting the bread-fruit tree, which he had named *Siphonophora artocarpi*; at the conclusion of his paper he alluded to the use of Paris-green as a destructive agent for insects. Mr. Blandford then made some remarks as to the use of London-purple (another arsenic compound) as an insecticide in the place of Paris-green; he stated that the compound was a waste product and one-tenth the cost of Paris-green, and further that it was more soluble and more easily applied; he was also of opinion that arsenic compounds do

not greatly affect sucking insects, such as Aphides, the ordinary kerosene preparations being more suitable for their destruction. Several Fellows took part in the discussion that followed.—W. W. FOWLER, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —June 26th, 1890.—J. T. Carrington, F.L.S., President, in the chair. Mr. Hawes exhibited larvæ of *Thecla rubi*, L., feeding on broom, upon which Mr. Hawes stated he saw the ova deposited. Mr. R. Adkin, a bred series of *Epione advenaria*, Hb., &c. Mr. Turner, the *gracilis* form of *Taniocampa stabilis*, View. Mr. Robinson, a long series of *Sesia sphegiformis*, Fb., from Sussex, about half of them having been taken by "assembling," the remainder being bred by him. Mr. Mansbridge, a fine variety of *Cænonympha pamphilus*, L. Mr. South, on behalf of Mr. Leech, a number of Micro-Lepidoptera collected in Normandy, and commented on the fact that, with one exception, all the species occurred in this country. Mr. C. Fenn, two dark specimens of *Eupithecia rectangulata*, L.; also Tortrices taken and bred by him this year, from the South of London, including a fine series of *Tortrix branderiana*, St. Mr. Cockerell, a larva of *Taniocampa incerta*, Hufn., found feeding on the leaves of mulberry. Mr. Billups, on behalf of Mr. Leech, types of forty species of Coleoptera, one of Ichneumonidæ, one of Diptera, and one of Homoptera, from Normandy, nearly the whole of which were represented in this country. Mr. Billups' other exhibits were twenty-nine species of Diptera, twenty-three of Hymenoptera, five of Coleoptera, two of Hemiptera, and one each of Homoptera and Neuroptera,—in all 104 insects, representing ten families, taken at the Society's excursion to Mickleham, on the 21st of June. (See list of species, ante p. 256). Mr. Mansbridge, *Leptida brevipennis*, Mils., and in reply to Mr. Billups said he believed there were some wicker baskets stored where they were captured. Mr. Billups said that the specimens had probably been brought here in these; some years before a number of Dutch baskets were stored in the Borough Market, and from these a quantity of the species now exhibited were bred. Mr. Tugwell showed a collection of plants from the North. A discussion on the effect of temperature affecting the emergences of Lepidoptera, in which Messrs. Carrington, Fenn, Tutt, Tugwell, South and Adkin took part, brought the meeting to a close.

July 10th, 1890.—Mr. W. H. Tugwell, Vice-President, in the chair. The Rev. C. Thornehill, Rev. E. C. Dobrée-Fox, and Mr. B. A. Bristowe, were elected members. Mr. Wellman exhibited a variable series of one hundred examples of *Eupithecia rectangulata*, L., taken at Streatham Hill, from six apple trees; *Dianthæcia cucubali*, Fues., Liverpool; *D. carpophaga*, Bork., var. *capsophila*, Dup., from Isle of Man and S. Scotland; *D. nana*, Rott., from Surrey and Ireland. Mr. Jäger, also *D. carpophaga*, from South Wales, and the variety *capsophila*, from the Isle of Man, and *D. cæsia*, Bork., from the same locality. Mr. R. Adkin, *Coremia designata*, Hufn., from Surrey, varying in width and density of coloration of central band; also *Eupithecia nanata*, Hb., from Hants and Surrey; and called attention to the extreme variability of the species. Some observations were made on the latter exhibit of Mr. Adkin, in the course of which Mr. C. G. Barrett and Mr. Tutt expressed opinions that *curzoni* was only an extreme form of *E. saturata*. Mr. Gerrard showed *Emydia cribrum*, L., and case of *Psyche villosella*, Och., from the New Forest. Mr. Mansbridge, *Xylophasia rurea*, Fb., var. *combusta*, Dup. Mr. Dennis, a pale specimen *nis euphrosyne*, L., from Dorking. Mr. Croker, *Nola cucullatella*,

L., from Kent. Mr. E. Joy, *Meliana flammea*, Curt., and *Nascia ciliaris*, Hb., from Wicken Fen. Mr. Howard Vaughan, *Melitæa aurinia*, Roth., *Cænonympha typhon*, Roth., *Nemeophila russula*, L., *Crambus sylvellus*, Hb., *Scoparia ambigua*, Tr., and var. *atomalis*, from North Knapdale; *S. ambigua* var. *atomalis*, *Hypsipetes trifasciata*, Bork., and *Coremia designata*, &c., from Kilmartin parish, Argyllshire; dark forms of *Larentia viridaria*, Fb., and two male *Procris* which differed considerably from *P. statice*, and upon the identity of which the members did not hazard an opinion. Mr. Vaughan remarked that they appeared to him to be intermediate between *statice* and *globularia*. Adverting to Colonel Blathwart's communication to the 'Entomologist's Monthly Magazine' for the month of April last, p. 109, Mr. Jenner Weir exhibited specimens of the two forms of *Volucella bombylans* which mimicked *Bombus lapidarius* and *Bombus terrestris* respectively, stating that he fully concurred with the Colonel in considering that this remarkable dimorphic condition of the *Volucella* assisted it to become parasitic upon two species of *Bombus* differing both in colour and markings. He also exhibited a specimen of the *Volucella* which he had recently taken at Bournemouth, in which the mimicking was imperfect, inasmuch as the arrangement of the colour resembled that of *Bombus lapidarius*, but instead of the hairs at the end of the abdomen being red they were of a yellowish colour, as in the mimic of *Bombus terrestris*. He showed also a specimen of the large worker of *Formica rufa* to the antenna of which was attached, by the closed jaws, the head and part of the thorax of another ant with which no doubt it had fought and destroyed the abdomen and most of the thorax of its adversary, but could not detach the head.

CITY OF LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—
 July 17th.—Mr. J. A. Clark, President, in the chair. Mr. A. H. C. Hamilton, of Cheverton Road, N., was elected a member of the Society. Mr. Lewcock exhibited *Philonthus decorum*, from Highgate; and *Liophlaeus nubilus*, from Claygate; also, on behalf of Mr. Cripps, *Grammoptera præusta*, *Toxotus meridianus*, and *Silpha 4-punctata*, taken on hawthorn at Brockenhurst during Whitsuntide. Mr. Heasler, *Harpalus servus*, *Calathus fuscus*, *Panagæus 4-pustulatus*, *Amara ovata*, and numerous other species of Coleoptera from Deal sandhills. Mr. Clark, a box containing beetles captured at sugar at Brockenhurst, including *Carabus catenulatus*, *Pterostichus niger*, *Anchomenus junceus*, &c. Lepidoptera: Mr. Clark exhibited *Emmelia decolorata*, Hb., bred from larvæ received from north of Ireland, and a variety of *Ematurga atomaria*, L., from Brockenhurst. Mr. Bellamy, *Thyatira batis*, L., *Miana arcuosa*, L., and vars. of *Abraxas grossulariata*, L. Mr. Gurney announced that since last meeting he had bred several more *Phorodesma smaragdaria*, Fb. Mr. Battley, while sugaring at Southwell, had captured some three dozen species, including *Nola cucullatella*, L. (on the wing between 12 and 1 at night), and several *Miana arcuosa*, L. The latter insect first appeared at 9.30, crawling up the stems of grass, remaining there until 11.30; flight then took place for about an hour, when it again sought the grass stems. Mr. Lewcock read portions of a letter received from Mr. P. W. Jarvis (of Cape Town), referring to the method of capturing certain species of Cicindelidæ in South Africa. The beetles referred to inhabit the coast, and are found just above high-water mark. Having procured a piece of a whale's rib-bone about a foot long (common in these parts), a certain sandhill is selected for operations, which are commenced by carefully scraping the sand away, taking but a thin

shave at a time, and continuing until a depth of four or five inches is reached; if nothing is found, a move is made a few feet further, and the scraping again proceeds. If fortunate, out runs a fine amber-coloured tiger beetle; if two are found in a sandhill, operations are carried on until the whole of the surface is removed, and all the beetles are captured. *Cicindela capensis*, a pretty tiger beetle about the size of the British *C. campestris*, but brown, with longitudinal irregular lines, is frequently found in this manner on the South African coast.—G. A. LEWCOCK and E. HANES, *Hon. Secs.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—June 16, 1890.—Mr. W. G. Blatch, President, in the chair. Mr. Herbert Stone presented a number of dried plants to form the basis of a herbarium for the Society's use. Mr. E. C. Tye showed larvæ of *Lobophora viretata*. Mr. R. C. Bradley showed a long and variable series of *Selenia tetralunaria*. Mr. W. G. Blatch exhibited the following Coleoptera from Bewdley, all being new to the locality:—*Perileptus areolatus*, *Homalota longula*, *H. subtilissima*, *Scopaus* — sp.? (same as the one exhibited on June 2nd, and taken at Ludlow), *Thinobius longipennis*, *Calodera umbrosa*, *Trogophlæus subtilis*, and *Actidium concolor*; the last two species being also new to the Midlands. Dr. P. B. Mason then exhibited his Icelandic insects, and made remarks on them. He described the country and the difficulties of collecting there; he related all that had hitherto been known of Icelandic Entomology, and he gave a complete list of the insects he had taken, and made many interesting remarks on them. The list has already appeared in the Ent. Mo. Mag. for July. The great peculiarity about the insect fauna is the entire absence of Rhopalocera and Orthoptera.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

REVIEW.

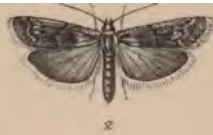
The Lepidopterous Fauna of Lancashire and Cheshire. By JOHN W. ELLIS, M.B.(Vic.), F.E.S. 8vo, pp. 136. Leeds, 1890.

A most useful annotated list of the lepidopterous insects found in Lancashire and Cheshire. Of the 2079 species known to occur in Britain the author enumerates 1355 as found in his district.

The arrangement of the Macro-lepidoptera is in accordance with that adopted by Kirby in 'European Butterflies and Moths,' whilst the Micro-lepidoptera are arranged as in Dr. M. Wocke's portion of the 'Catalog der Lepidopteren des Europäischen Faunengebiets.'

OBITUARY.

WITH very great regret we have to record the death of WILLIAM CLAYTON, of Wadworth Wood House, who died on June 9th, 1890, at the early age of twenty-one years. Mr. John N. Young, of Rotherham, writes of the deceased as follows;—"Living at the edge of the wood, he had a grand opportunity of working up the insect fauna of the district, and of this he was not slow to avail himself. He was always most willing to give information and assistance to entomologists visiting the wood at any time. The frequent visits of myself and other brethren of the net were always a source of real pleasure to him. Always a pleasant companion, a sincere friend, and a most enthusiastic collector, he will be sorely missed, not only by his sorrowing parents and family, but by his entomological friends and correspondents."



West, Newman
(Horace Knight) lith

Deltoids Pyralides, Crambi & Plusia Moneta.

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ADDITIONS TO THE BRITISH LIST OF DELTOIDS, PYRALIDES, AND CRAMBI, SINCE 1859.

BY RICHARD SOUTH.

(PLATES III. & IV.)

SINCE the publication of the second volume of Stainton's 'Manual of British Butterflies and Moths,' in 1859, a large number of additions have been made to the British list; but in the present paper it is not proposed to do more than bring together the various Deltoids, Pyralides, and Crambi which have been introduced as British species since the year adverted to. Several of the insects brought forward as new to science have been, by a consensus of opinion, reduced to varietal rank; others have had their right and title to specific rank vigorously assailed; and it seems probable that their degradation, by common consent, is fast approaching, and that their fate will not be relegated to the dim and distant future to decide. The earliest English descriptions have been reprinted in the majority of cases, and the references to the British literature, though probably not exhaustive, will perhaps be of some service to those who may be interested in the matter. Two of the species had a place in our lists previous to 1859, but were not included in the 'Manual.'

To those gentlemen who, in the kindest way, have placed their valuable specimens at my disposal for figuring, I tender my most sincere thanks.

DELTOIDS.

HERMINIIDÆ.

ZANCLOGNATHA EMORTUALIS, Schiff. (Pl. III. fig. 1.)

BRITISH REFERENCES:—

Polypogon emortualis, Steph. Cat. ii. p. 158 (1829).

Ethia emortualis, Steph. Ill. Brit. Ent. Haust. iv. p. 18 (1834).

ENTOM.—SEPT, 1890.

Sophronia emortualis, H. Cooke, Intell. v. p. 123 (1859);
Stainton, Entom. Ann. 1860, p. 132; Birks, Intell. ix.
p. 28 (1860); Doubl. List, p. 37.

Zanclognatha emortualis, South, Syn. List, p. 11; Leech,
Brit. Pyral. p. 3, pl. i. fig. 8 (1886).

Expanse, 1 in. 3 lines. Light yellowish olive. The fore wings are traversed by two whitish lines, the first almost straight, the second curved and continued across the hind wings; between the lines on fore wings is a short whitish lunulated line.

DISTRIBUTION.—Central Europe; Sweden; Livonia; Piedmont; Dalmatia; Ural; Amur.

Note.—Stephens described this insect in 1834, but his description does not appear to be very accurate. He remarks, "A specimen is in the cabinet of W. Swainson, Esq.; and I possess one captured in Devonshire." Wood's figure (768) of *emortualis*, in the Westwood edition of the 'Index Entomologicus,' is suggestive of *derivalis*, rather than the species it is said to represent. Altogether there seems to have been some hesitation on the part of British entomologists with regard to the right of *emortualis* to a place in our lists; and it was not until the year 1859 that anything further was heard of the species. In the year last mentioned, Mr. H. Cooke recorded and described a specimen which had been taken by Mr. Pocock in Brighton, on the 18th of June, 1858. In the year following, the Rev. B. H. Birks, of Stonor, Henley-on-Thames, took a specimen at sugar on the 12th of July. These are the only records of the capture of this species in Britain that I can find.

HYPENIDÆ.

HYPENA OBSITALIS, Hübn. (Pl. IV. fig. 9.)

BRIT. REF.:—

Hypena obsitalis, Cambridge, Entom. xvii. p. 265 (woodcut),
(1884); P. Dors. N. H. S. vi. pl. iii.; Leech, Pyral. p. 7,
pl. xiii. fig. 7 (1886).

Expanse, 1 in. 3 lines. Fore wings broad, pointed at the tips. Brown, with numerous fine transverse darker lines; beyond the middle is a thicker dark angulated line, edged externally with pale brown, especially near the costa; submarginal line represented by some minute white dots placed on the nervules, and there are some black longitudinal streaks below apex. The stigmata are black, but hardly well defined. Hind wings fuscous-brown, venation and central lunule darker.

Var. *a*.—Expanse, 1 in. 5 lines. Fore wings pale reddish brown, without fine transverse lines; the angulated line is preceded by a broad triangular blackish patch enclosing the stigmata; a smaller blackish patch on the outer margin below apex.

Larva bright yellowish green, with a dark dorsal and pale subdorsal lines. Feeds in May on *Parietaria* (pellitory), Leech.

DISTRIBUTION.—Southern Europe; Carniola; N. W. Asia Minor; Cyprus; Syria; Armenia; Algiers and N. Morocco; Canaries; England.

Note.—So far only one example of this species has occurred in Britain. This specimen, which is of the typical form, was found by the Rev. O. Pickard Cambridge, on the 21st September, 1884, resting on a door-jamb in his garden at Bloxworth, Dorsetshire. The descriptions of the imago, given above, were taken from specimens captured by Mr. Leech at Mogador.

PYRALIDES.

PYRALIDIDÆ.

Pyralis lienigialis, Zell. (Pl. IV. fig. 13.)

BRIT. REF. :—

Pyralis lienigialis, Thompson, Entom. xiv. p. 84; Carrington, *op. cit.*, p. 304, pl. i. fig. 21; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 13, pl. vii. fig. 1.

Asopia lienigialis, Thompson, Barrett, and Stainton, Ent. Mo. Mag. xvii. p. 256.

Mr. Barrett (*l. c.*) finds that although some specimens of *P. lienigialis* may resemble *P. farinalis* in colour, the first whitish line of the former is "nearer the middle of the wing, the basal blotch being therefore larger and the median area smaller"; the second line commences as a pale blotch on the costa, and is more regularly curved than in *farinalis*. "In the hind wings the first delicate pale striga, which in *farinalis* forms a continuation of the first line on the fore wings, is, in *lienigialis*, placed more perpendicularly, so that it originates *opposite the middle of the basal blotch of the fore wings.*"

DISTRIBUTION.—Livonia; Finland; England.

Note.—Captured at light in August, 1879, by Mr. Thompson, at Stoney Stratford, Bucks, and introduced by him in April, 1881. Other specimens were taken by Messrs. Thompson and Bryan; August and September, 1880.

SCOPARIA BASISTRIGALIS.

BRIT. REF. :—

Scoparia basistrigalis, Knaggs, Ent. Mo. Mag. iii. p. 1 (wood-cut); v. p. 293, pl. i. fig. 6; Briggs, Entom. xviii. p. 130; xx. p. 17; xxii. p. 17; Tutt and Briggs, E. M. M. xxvi. p. 51; Porritt, *op. cit.* p. 88; Entom. xii. p. 225; Doubl. List, Suppl. p. 2; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 14, pl. xiv. fig. 4.

Expanse, 9—10½ lines. "Fore wings in both sexes broad, of rhomboidal shape... ground colour clear greyish white, thickly sprinkled with numerous black atoms. Basal area with two short distinct black streaks passing from the base of the wing along the subcostal and median nervures respectively.... First line, commencing obliquely from the costa, passes backwards and inwards to the orbicular stigma, thence forwards and inwards to meet the claviform stigma, which is incorporated with (not detached from, as in some of the genus) this line, and finally, with an S-like bend, reaches the inner

margin. Medial area; the orbicular and reniform stigmata are situated on patches of dark fuscous colour, the black outline of the latter (the reniform, or 8-mark) forming an 8-like mark. . . . Hind wings silky white, with a very slight fuscous tint."

The above description is abridged from that given by Dr. Knaggs (Ent. M. M. iii. p. 1), who adds that the only *Scoparia* with which one could confound *basistrigalis* is *ambigualis*, "but the greater width of fore wing, giving the appearance of its being actually shorter, . . . together with the distinct basal streaks, the oblique commencement of the first line, &c., are amply sufficient to separate it from that insect."

Introduced by Dr. Knaggs in June, 1866.

BRITISH LOCALITIES.—Surrey; Sussex; Worcestershire; Yorkshire.

Note.—Our knowledge of the distribution of this species is not altogether satisfactory. Mr. Tutt says that he has the species from almost every locality he has worked; whilst Mr. Porritt is of opinion that many of the supposed *S. basistrigalis* in collections are not that species at all, but merely forms of *S. ambigualis*. The latter gentleman records the occurrence of large numbers of *basistrigalis* in Edlington Wood, near Doncaster, on August 4th, 1879.

SCOPARIA ZELLERI, Wocke.

BRIT. REF. :—

Scoparia zelleri, Header and Knaggs, Ent. Mo. Mag. v. pp. 131, 293, pl. i. fig. 7; Knaggs, Ent. Ann. 1869, p. 126; Jordan, E. M. M. vi. p. 14; Thompson, E. M. M. vii. p. 86; Briggs, Entom. xviii. 130; Doubl. List, Suppl. p. 2; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 13, pl. xiv. fig. 2.

"Nearly allied to *S. ambigualis*, but it is considerably larger than that species. It is also broader in the fore wing, the apical margin of which is a trifle more vertical; the whitish ground colour stands out more conspicuously on either side of the central fascia; the apical aspect of the central fascia (*i. e.*, the second line) is more deeply crenated than in *ambigualis*. Mr. Horton's example exceeds in alar expanse the largest *cebræ* with which I have yet met" (Knaggs).

Introduced by Dr. Header, October, 1868. The first specimen noticed in Britain was that taken by the Rev. E. Horton, in Dr. Header's dining-room at Carmarthen, in July, 1868; but Mr. H. Pryer captured a specimen on the 17th of August of the year previous, at Norwood.

DISTRIBUTION.—Silesia; Central and Western France; England.

Note.—*Zelleri* is probably only a form of *S. cebræ*.

SCOPARIA SCOTICA.

BRIT. REF.:—

Scoparia scotica, White, Ent. Mo. Mag. viii. p. 169; Weston, Entom. x. p. 92; Briggs, Entom. xviii. p. 130; Doubl. List, Suppl. p. 2; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 14, pl. xiv. fig. 3.

"Closely allied to *Scoparia cembræ*, from which it differs in the front wings being less oblong, and more triangular and dilated before the hind margin, as well as by the breadth across the hind margin being greater in proportion to the length of the wing" (White).

Introduced by Dr. Buchanan White, January, 1872. Habitat, Scotland.

Note.—*Scotica* differs from *cembræ* in colour and intensity of markings; thus, the fore wings are grey instead of brownish, and the lines and stigmata are more conspicuous. Most entomologists, however, will accept the dictum of the late Mr. Weston, who wrote of *scotica*, in 1877:—"Must, I fear, stand only as a variety of *S. cembræ*. Even its sponsor is, I think, now of this opinion."

SCOPARIA INGRATELLA, Zell.

BRIT. REF.:—

Scoparia ingratella, Knaggs, Ent. Mo. Mag. iv. p. 61; Ent. Ann. 1868, p. 109; E. M. M. v. p. 293, pl. i. fig. 2; Weston, Entom. x. p. 92; Briggs, Entom. xviii. p. 130; Bankes, E. M. M. xxiii. p. 258; Tutt, Entom. xix. p. 129; E. M. M. xxiv. p. 42; Doubl. List, Suppl. p. 2; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 16, pl. xiv. fig. 10.

Comparing it with *S. dubitalis*, Hübn., Dr. Knaggs says that *ingratella* is much larger in size, "the black markings are absent or very faint." He concludes his remarks by observing that "although there can be no doubt that the Folkestone specimens are specifically identical with the continental *ingratella*, I am by no means over positive that both may not possibly some day turn out to be varieties of *pyralella* (= *dubitalis*), which is certainly an excessively variable species." Mr. Weston says that "Mr. Machin reared *ingratella* from larvæ in the roots of sorrel, collected at Folkestone in April, 1867."

Introduced by Dr. Knaggs in August, 1867.

DISTRIBUTION.—Austria; Hungary; Switzerland; Dalmatia; Syria; Armenia; England.

SCOPARIA ULMELLA, Dale MS.

BRIT. REF.:—

Scoparia ulmella, Knaggs, Ent. Mo. Mag. iii. p. 217 (woodcut), v. pl. i. fig. 12; Ent. Ann. 1868, p. 109; Briggs, Entom. xviii. p. 130; xx. p. 17; Doubl. List, Suppl. p. 2; South, Syn. List, p. 17; Leech, Brit. Pyral. p. 15, pl. xiv. fig. 8.

Eudorea ulmella (Dale), Mason, Ent. Mo. Mag. xxiii. p. 163 (woodcut).

Eudorea conspicualis, Hodgn., Entom. xiv. p. 223 (Oct. 1881), pl. i. figs. 8, 9 (Dec. 1881); Ent. Mo. Mag. xviii. p. 134 (Nov. 1881); Mason, E. M. M. xxiii. p. 163.

Scoparia conspicualis, South, Syn. List, p. 17; Leech, Brit. Pyral. p. 15, pl. xiv. fig. 7.

"*S. ulmella* bears some affinity to *S. dubitalis*, chiefly by reason of the 8-mark being dumb-bell shaped, and filled in with ochreous, but its slender conformation precludes the possibility of its being connected with that species. The characters of the 8-mark separate it from the *mercurella* group, and it is with equal ease distinguished from the *angustea* group by the character of the first line" (Knaggs).

Introduced by Dr. Knaggs, March, 1867.

Note.—Three examples of this species were taken by Mr. Dale on a trunk of wych elm, at East Meon, July, 1844. Nothing further seems to have been heard of the insect until a *Scoparia* was turned up in some numbers in the North of England by Mr. Hodgkinson, and subsequently by Mr. Prest and others. The former gentleman considered the species new to science, and described it under the name of *conspicualis*; but Dr. Mason as recently demonstrated that Hodgkinson's insect is identical with *ulmella*, Dale.

BOTYDÆ.

MECYNÀ POLYGONALIS, Hübn. (Pl. III. fig. 7.)

BRIT. REF. :—

Margaritia diversalis (Hübner), Steph. Ill. Brit. Ent. Haust. iv. p. 47 (1834); Wood, Index (Westw. Ed.), p. 124, pl. 28, fig. 807.

Mecynà polygonalis, Newman, Entom. v. p. 32; Doubleday, *op. cit.* p. 76; Haggard, Entom. viii. p. 300; Weston, Entom. x. p. 92; Tugwell, *op. cit.* p. 255; Doubl. List, p. 18; South, Syn. List, p. 18; Leech, Brit. Pyral. p. 32, pl. iv. fig. 3.

Expanse 15—18 lines. Fore wings: basal half and outer fourth dark brown or blackish, the space between grey-brown or whitish grey; orbicular dot-like, reniform well-defined, both black; first line oblique and wavy, the basal area within this line is sometimes paler; second line serrated, elbowed below costa, approximating to first line on inner margin. Hind wings yellow, broadly bordered with black.

The above description is drawn from specimens from Lebanon, for which I am indebted to Mr. Leech.

Ab. *diversalis*. "Head, thorax, and anterior wings yellowish brown, the latter with two obscure waved streaks, with two dusky spots between, one small, the other larger and reniform; on the extreme hinder margin is a row of minute black dots, cilia yellowish brown: posterior wings dull orange-yellow, with an

irregular interrupted dusky fascia on the hinder margin; cilia dusky yellow." (Stephens.) An example of this form in the British Museum collection, was taken near Bristol, in July, 1815.

BRITISH LOCALITIES.—Bristol; Folkestone; Bury St. Edmunds.

DISTRIBUTION.—Central and Southern Europe; Syria; Canaries.

Note.—This species varies considerably in tone and intensity of colour of forewings, and the black border of hind wings is subject to modification as regards its breadth, in some examples this band is contracted, and in others interrupted before the anal angle.

BOTYS REPANDALIS, Schiff. (Pl. IV. fig. 6.)

BRIT. REF.:—

Botys repandalis, Barrett, Ent. Mo. Mag. xxiii. p. 145.

"Closely allied to *hyalinalis* and *pandalis*, but of a paler yellow, and decidedly smaller than either, being of about the size of *verbascalis*, but with narrower fore wings. The fore wings are of a delicate pale straw-colour, and the markings, which closely resemble those of *hyalinalis*, are of a faint yellowish grey. The first line is comparatively straight, the second also straight from the middle of the dorsal margin to the middle of the wing, where it touches the discal streak or stigma, then turns abruptly towards the hind margin, and makes a wide sweep before turning again towards the costa; the third is parallel with the hind margin. These three lines are continued upon the silky whitish hind wings" (Barrett).

Introduced by Mr. Barrett, December, 1886.

DISTRIBUTION.—Central and Southern Europe.

Note.—Bred some years previous to 1866 by the Rev. Henry Burney, who reared specimens from larvæ found feeding, in June, in the heads of young shoots of *Verbascum nigrum*, growing on the south coast of Devonshire. The larva is described as "Yellowish white, with black spots."

EBULEA STACHYDALIS, Zinck. (Pl. IV. fig. 10.)

BRIT. REF.:—

Ebulea stachydalis, Barrett, Ent. Mo. Mag. xii. p. 158; xiii. p. 93; xiv. p. 159; Carrington, Entom. x. p. 81 (woodcut); Bond. Proc. Ent. Soc. Lond. 1876; Buckler, E. M. M. xiii. p. 133 (larva); McLachlan, *op. cit.* p. 64; Jeffrey, E. M. M. xiv. p. 115; Rogers, Entom. xvi. p. 46; South, Syn. List, p. 18; Leech, Brit. Pyral. p. 39, pl. v. fig. 3.

Usually smaller than *E. sambucalis*, which in colour and marking it greatly resembles, but the pale yellow or whitish triangular spot placed below the larger square spot on the fore wing of that species is absent in *stachydalis*, and the submarginal line, composed of pale yellow or whitish spots in both species, is

curved but not indented below the costa as in *sambucalis*; again, in *stachydalis*, the first three spots are but little, if any, larger than the others in the series forming the line. On the hind wings the two outer spots are almost confluent in *sambucalis*, but in *stachydalis* they are widely separated, one is near the costa and in conjunction with the central spot, and a submarginal chain of smaller spots, form a fairly distinct ring around what would be in *sambucalis* the lower discal spot.

The larva feeds in September on *Stachys sylvatica*, on the leaves of which it "lives in a sort of tube, formed either by turning down the tip of a leaf, and folding it closely on to the under surface with a quantity of silk, or else by drawing together a fold of the under surface, and covering it over with a thick silken web, in either case leaving an opening at each end" (Buckler).

Introduced by Mr. Barrett, December, 1875. Occurs in several English localities.

DISTRIBUTION.—Central Europe; Sardinia.

PSAMOTIS PULVERALIS, Hübn. (Pl. IV. fig. 1.)

BRIT. REF.:—

Lemiodes pulveralis, Meek, Ent. Mo. Mag. vi. p. 141; Entom. v. p. 31; Knaggs, Ent. Ann. 1870, p. 140; E. M. M. xi. p. 117; Cooke, E. M. M. vii. p. 86; Barrett, *op. cit.* p. 111; Doubl. List, Suppl. p. 2; Weston, Entom. x. p. 92; Ragonot, E. M. M. xvi. p. 271.

Psamotis pulveralis, South, Syn. List, p. 18; Leech, Brit. Pyral. p. 41, pl. v. fig. 7.

Expanse $10\frac{1}{2}$ —14 lines. ♂. Pale ochreous brown sprinkled with black atoms; first line straight, brown, but not clearly defined; second line brown, oblique, and slightly curved below costa. Hind wings rather paler, with a distinct brown transverse central line; all the wings have a submarginal fuscous shade-like band, and the space between this and 2nd line appears paler, distinctly so in some specimens. Fringes silky, preceded by a thin brown line. ♀. Similar to the male, but the wings are less ample.

Mr. Ragonot says that Herr Mühlig has found the larva on *Mentha aquatica* in August, but it has not been described.

Introduced by Mr. E. G. Meek, November, 1869. The species is now in most collections, but has become scarce, if not quite extinct in its original haunt, the Warren, at Folkestone.

BRITISH LOCALITIES.—Isle of Wight; Folkestone; Ranworth.

DISTRIBUTION.—Central and South Eastern Europe; Armenia.

Note.—The specimens described by Stephens in 1834 (Ill. Brit. Lep. Haust. iv. p. 55) as *P. pulveralis*, are referable to *Botys fuscalis*, Schiff.

MARGARODES UNIONALIS, Hübn. (Pl. III. fig. 3.)

BRIT. REF.:—

Margarodes unionalis, Stainton, Intell. vii. p. 19; Ent. Ann. 1860. p. 133, pl. i. fig. 4; Steward, Zool. 1861, p. 7799 ;

Tugwell, Entom. x. p. 255; Crewe, *op. cit.* p. 296; E. M. M. xiv. p. 149; Mathew, *op. cit.* p. 157; Knaggs, Ent. Ann. 1870, p. 127; Doubl. List, Suppl. p. 2; South, Syn. List, p. 18; Leech, Brit. Pyral. p. 44, pl. v. fig. 12.

"It is paler than *Palealis*, whiter and more iridescent, but has a brownish streak along the costa, edged below with yellowish, and there is a row of minute black dots along this yellowish border and on the hind margin, also a black dot at the termination of the discoidal cell of the anterior wings. Size 1 in. 2 lines" (Stainton).

Introduced by Mr. Stainton, October, 1859.

BRITISH LOCALITIES.—Torquay; Kent, S. Coast; Tresco; Gravesend; Forest Hill; Isle of Wight; Brighton.

DISTRIBUTION.—South Europe; England.

Note.—Mr. Pearce informs me that he captured a specimen at a street lamp in Gosport, on October 23rd, 1884.

STENIIDÆ.

DIASEMIA RAMBURIALIS, Dup. (Pl. III. fig. 10.)

BRIT. REF.:—

Diasemia ramburialis, Boyd, Intell. iv. p. 151; Stainton, Ent. Ann. 1859, p. 149, pl. i. fig. 3; Verrall, Ent. Mo. Mag. iii. p. 163; Purdey, Entom. xi. p. 273; Salwey, Entom. xiii. p. 283; Digby, E. M. M. xxv. p. 381; Doubl. List, p. 17; South, Syn. List, p. 18; Leech, Brit. Pyral. p. 45, pl. vi. fig. 2.

"Closely allied to *Literalis*, but more glossy, and the markings more irregular" (Boyd).

Introduced by Mr. Boyd, August, 1858.

ENGLISH LOCALITIES.—Probus, Cornwall; Lewes; Folkestone; Dover; Portland.

DISTRIBUTION.—South Western Europe; Austria; England; Australia.

Note.—This species is said to fly in swampy places at dusk, and has been beaten from the flowers of hemp agrimony (*Eupatorium cannabinum*). Has been taken in June, July, September and October, so that it is probably double-brooded.

ANTIGASTRA CATALAUNALIS, Dup. (Pl. III. fig. 4.)

BRIT. REF.:—

Ebulea catalaunalis, Stainton, Ent. Mo. Mag. iv. p. 152; Knaggs, Ent. Ann. 1868, p. 108, pl. i. fig. 4. Doubl. List, Suppl. p. 2.

Antigastra catalaunalis, South, Syn. List, p. 18; Leech, Brit. Pyral. p. 45, pl. vi. fig. 3.

"The ground colour of the fore wings is pale sulphur, the nervures being mapped out with ferruginous, an accumulation of which tint occurs towards the hind margin; at the base of the

cilia is a dark, almost black line; the fringes themselves are cream-coloured; the hind wings are whitish, but ferruginous towards the hind-margin, especially near the apex. Abdomen and antennæ long. Sexes very much alike" (Knaggs).

Introduced by Mr. Stainton, December, 1867.

ENGLISH LOCALITY.—Cheshunt.

DISTRIBUTION.—South Western Europe; Syria; Bengal; England.

Note.—Dr. Knaggs says this species had been previously reputed British, but this was a mistake, and arose from the fact that *catalaunalis* was supposed to be synonymous with *Nascia ciliialis*, Hübn.

(To be continued.)

NOTES ON SOME SPECIES OF GALL-GNATS (CECIDOMYIÆ).

By T. D. A. COCKERELL.



♂ GENITALIA OF *Cecidomyia* (all enlarged).

1. *C. s-batatas*, ♂ forceps. 2. *C. frater*, ♂ forceps. 3. *C. s-brassicoides*, ♂ forceps.

WHILE living in Colorado I was able to breed several of the species of gall-gnats found in that state, but could never work out their nomenclature in a satisfactory way, not having access to sufficient of the literature of the subject. Now, however, I have been able to make the proper enquiries and comparisons, and present some of the results herewith.

The galls produced by the species of *Cecidomyia* are very various in form, and of great interest from several points of view. They are also, as a rule, not difficult to identify. The gall-makers, on the other hand, are often very closely allied, and exceedingly hard to name even when alive; dead specimens become so shrivelled as to become almost useless unless something is known of their life-history. Probably nearly all the species which have been described by Walker and others, from dead specimens which have no history, will have to be put aside as unrecognisable.

CECIDOMYIA RIGIDÆ, *Osten-Sacken*.

= *salicis*, Fitch, non Schr. = *salicis-siliqua*, Walsh (var.).

Gall.—A red fusiform swelling on the twigs of *Salix*, tapering at either end, and often emitting one or more small twigs. These galls are smooth

and red like the twigs on which they grow; they appear to have their origin in aborted buds; they contain a single cavity.

Larva.—Long. 4, lat. $1\frac{1}{2}$ mm. Subcylindrical, bright orange, tinged with crimson above. (Extracted from gall Jan 27th, 1890.)

Pupa-shell.—Larger than that of *C. s-batatas*. Coverings of antennæ, legs and wings grey, in striking contrast to the white abdomen.

Imago.—Long. $4\frac{1}{2}$, al. exp. 9 mm. ♀. Antennæ 20-jointed.

The above description refers to the species found at West Cliff, Colorado, which I have hitherto called *C. s-siliqua*. It is very probably identical with Walsh's species, but on the whole it agrees better with *rigidæ*, as described by Fitch. Walsh describes *salicis-siliqua* as having the origin of the anterior branch of the third longitudinal vein pretty distinct, which is not the case with my species, but Walsh admits *s-siliqua* to be variable in this respect.

The *West Cliff* species has the thorax dull black, with rather coarse pale hairs at the sides; halteres brownish; abdomen dull dark brown or brown-black, clothed at sides and beneath with white hairs. Legs grey-brown, pink at joints; wings hyaline, veins brown. These notes are from fresh specimens, which emerged from the galls in May, 1890. Fitch's species is said to have the tarsi black, and the wings smoky brown.

I think the Colorado species may be safely referred to *rigidæ*. and Walsh's *salicis-siliqua* (a later name) to a variety of the same species. Still it is possible that Walsh's insect may be distinct.

CECIDOMYIA SALICIS-BATATAS, Walsh, 1864.

? = *spongivora*, Barnst. MS., Walker, 1848.

Gall.—A large, irregularly oval gall, at the end of a willow twig.

Pupa-shell.—Almost entirely white.

Imago.—♂. Long. $2\frac{1}{2}$ al. exp. 6 mm. Wings hyaline, pale greyish; third longitudinal vein very indistinct beyond the branch, or sometimes more distinct; second longitudinal vein conspicuous, and a lively brown, whereas the other veins are dark grey or black. Antennæ apparently 17-jointed. Thorax dark reddish brown, with subdorsal longitudinal lines of pale hairs; halteres greyish, pale at tips. Abdomen dark brown, the segments very distinct, covered with white hairs except at sutures beneath, and above the lower edge of each segment strongly fringed with long white hairs. Legs brown, pale at joints. (Described from fresh specimens.)

Hab. West Cliff, Custer Co., Colorado. Emerged from gall May 21st, 1889.

I have no doubt that the above species belongs with Walsh's *s-batatas*, although Walsh thought, "unless his memory failed him," that the male abdomen of his species was luteous when recent.

As to *spongivora*, so far as the description goes, it might well be this species. I have examined the types of *spongivora*, Barnst. MS., in the British Museum, and they agree in size and general appearance with the Colorado *s-batatas*. The thorax is dark, but the legs are rather paler than in the Colorado form:

the wings also are rather less ample perhaps, and rather straighter along the costa. A female specimen has a long, pale ovipositor. There is a label, presumably written by Barnston, "15 out round gall," with another word I fail to decipher.

There is, therefore, every probability that *spongivora* is the same as *s-batatas*; but under the circumstances I should hardly be justified in overthrowing Walsh's well-known name for an older one, which, after all, *may* possibly belong to something different.

With the types of *spongivora* in the British Museum there is a second species from Hudson's Bay, labelled (apparently by Barnston) "*lasiopterides*, from willow-rose." It is certainly different from *spongivora*, having a sand-coloured thorax with two dark longitudinal bands. I am not aware that this *C. lasiopterides* has been described, and it would hardly be wise to attempt a description from the Museum material.

CECIDOMYIA SALICIS-BRASSICOIDES, Walsh.

Imago.—♂. Long. 3, al. exp. 3 mm. Head black; antennæ with abundant long white hairs. Thorax black; halteres dark grey. Abdomen black or nearly so, with sparse long hairs; genitalia everted on a pedicel, inclined upwards; forceps black (pale at ends), greatly curved; style brownish, broad and thick. Legs grey-brown. Wings hyaline; venation as in *C. rigida*.

Described from fresh specimens, bred from galls on willow, West Cliff, Colorado, May, 1889.

This is the species, very common at West Cliff, which I have before called *s-strobiloides*, it having been so named for me at Washington. I think there is no doubt that it is really Walsh's *s-brassicoides*, with which the galls especially agree more than with any other described species.

These West Cliff galls occur in bunches, several together, as is described by Walsh, and are very suggestive of compact sprouts on a cabbage-stump; they taper somewhat at the end, being obversely pyriform; the leaves or scales covering them are mostly rounded.

CECIDOMYIA FRATER, n. sp. (vel *orbitalis*, Walsh, var.?).

Imago.—♂. About 2 mm. long. Halteres pinkish. Abdomen somewhat pinkish. Venation as in *C. bigeloviae*. Antennæ about 18-jointed. Otherwise much like *C. s-brassicoides*, except in genitalia.

Hab. West Cliff, Colorado. Bred May 19th, 1889, from gall of *C. s-brassicoides*.

This is clearly not Walsh's *C. cornuta*, but it is evidently very close to *C. orbitalis*. I should hesitate about describing it were it not that the male genitalia afford an easy means of distinguishing it from *s-brassicoides*, the terminal portion of the forceps being much more slender, and with coarser hairs, than in that species. In *C. s-batatas* (West Cliff examples) the terminal joint of the

forceps is still narrower in proportion to its length, *frater* being thus intermediate in this respect.

CECIDOMYIA ALTICOLA, n. sp.

Gall.—Globular wool-like galls, with radiating fibres, being the aborted flower-heads of a species of Compositæ. I collected these galls when the plant had died down, and only the dead stalks were left: it seems to be a *Chrysopsis* or *Solidago*.

Larva.—Colour orange.

Pupa-shell.—Long. $1\frac{1}{2}$ mill. White, with the thoracic coverings shiny grey.

Imago.—Expanse about 4 mill. Head dark; eyes very black; antennæ brownish, moniliform, 16-jointed, each joint emitting some (twelve or more) long white hairs; joints diminishing in size towards tip. Thorax dark. Legs brownish; halteres large, slightly hairy, tinged with reddish. Abdomen reddish or pale brown, the male genitalia much darker. Wings hyaline, with a row of strong bristles on the costa, and a strong fringe on inferior border. Venation simple; second longitudinal vein straight, fading towards margin, or reaching margin perhaps slightly below the apex of the wing; third longitudinal vein fading, or (in one male) curving abruptly downwards, reaching inferior margin, with no anterior branch.

Female abdomen redder than that of male; ovipositor very short.

Male genitalia differ from those of *Diplosis pyrivora* as follows:—In *C. alticola* the hairs of the first joint of the forceps are longer; and the second joint of forceps is less slender and less curved, being in fact quite thick.

One male appeared to have the antennæ 11-jointed only, but I am not sure that some joints had not been broken off.

Described from fresh specimens, bred April 24th (some earlier), from galls collected in 1890, at West Cliff, Colorado.

Many Cecids have been bred by different authors from species of Compositæ, but the present species seems quite distinct from all of them.

Of the American species *C. hirtipes*, O.-S., *C. solidaginis*, Lw., *C. racemicola*, O.-S., *C. anthophila*, O.-S., and *C. carbonifera*, O.-S., all on *Solidago*, make quite different galls from *alticola*. *C. anthophila*, which might possibly be confused with our species as to its gall, has also a quite different fly, with pale brown thorax and twenty-one antennal joints. *C. chrysopsidis*, Lw., makes a gall on *Chrysopsis mariana* which seems to be exceedingly like that of *alticola*, but the imago is different. There are also American species of *Asphondylia* and *Lasioptera* on Compositæ, but these need not be considered.

The European *C. obfuscata*, Mg., is said to have brown bands on the tibiæ and tarsi, but otherwise the imago seems a good deal like *alticola*, though it has a different life-history. *C. floricola*, Winn., is also rather like our species, but differs in a few points, besides breeding in *Achillea*. The recently described *C. florum*, Kieffer (Ent. Nach. 1890, p. 37), is evidently distinct; it feeds on

Artemisia, as do also *C. artemisiæ*, Bouch., *C. tubifex*, Bouch., and *C. foliorum*, Scholtz.

Inquilines and Parasites.

The following have been bred from galls, collected at West Cliff, Colorado, of the species considered above:—

- (1.) *Nematus concolor*, Nort. Bred May 15th, from gall of *C. rigidæ*.
- (2.) Pteromalid, long $2\frac{3}{4}$ mill. Bronzy green. Bred, May, 1889, from gall of *C. s-brassicoides*.
- (3.) Pteromalid, long. about $2\frac{1}{2}$ mill. Bronzy; legs partly dark brown and partly honey-yellow. Bred, May, from gall of *C. s-brassicoides*.
- (4.) *Eutelus* sp., about $1\frac{1}{2}$ mill. long. Yellowish green; legs pale yellow; venation yellow. Bred, May, from gall of *C. s-brassicoides*.
- (5.) *Eutelus* sp., similar to the last, but much smaller; abdomen more tapering. Bred, May, from gall of *C. s-brassicoides*.
- (6.) Pteromalid, rather smaller than No. 4. Black. Bred, May, from gall of *C. s-brassicoides*.
- (7.) Chalcid. Metallic greenish; legs pale brownish; antennæ pale at tips. Bred, May, from gall of *C. s-brassicoides*.
- (8.) Chalcid. Black or nearly so; head greenish; shape of abdomen rather like that of *Isosoma*. Bred, May, from gall of *C. s-brassicoides*.
- (9.) *Cecidomyia*, much like *frater*, but much smaller. Not sufficiently examined, but may be *albovittata*, Walsh. Bred, May, from gall of *C. s-brassicoides*.
- (10.) Chalcid. Black; legs honey-yellow; thorax smooth; flagellum pubescent. Bred, May, from gall of *C. s-brassicoides*.
- (11.) *Polygnotus error*, Fitch. Bred from gall of *C. s-brassicoides*.
- (12.) *Torymus* sp. Bred from gall of *C. rigidæ*.
- (13.) *Torymus* sp. Bred from gall of *C. s-brassicoides*.
- (14.) *Tetrastichus* sp. Bred from gall of *C. s-batatas*.
- (15.) *Torymus* (n. sp.?). Bred from gall of *C. alticola*.

I am indebted to Mr. W. H. Ashmead and the U.S. Department of Agriculture for assistance with the above Hymenoptera. The Chalcids have not been sufficiently studied as yet; probably some of the species bred will ultimately prove undescribed.

3, Fairfax Road, Bedford Park, Chiswick, London, W., July 11, 1890.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

BY F. H. PERRY COSTE, F.C.S.

(Continued from p. 252).

V.—THE CHEMICAL ASPECT.

A.

AT the close of Section IV. I wrote,* "It now remains to discuss the significance of these results, and offer such interpretation of them as we can." That is the task that is to be essayed in the remaining portion of these articles, and I am not unconscious of the fact that my interpretations may have to run the gauntlet of some criticism from readers of 'The Entomologist.' So far, in recording experiments and observations, I have been on fairly sure ground, but must now quit that for the region of hypotheses; far less certain ground, indeed, but yet without such hypothesising the most complete and extensive experiments and observations are almost valueless. We cannot mentally feed on several hundred isolated individual facts; such cannot be assimilated, nor will they conduce to mental growth any more than physically we can feed on atoms of carbon and nitrogen, &c., in place of bread or meat. In both cases some preliminary elaboration of the individual items is requisite; and possibly, if we had been suddenly set down to discover in what manner the physical ultimates of food must be combined for our physical sustenance, there would have been as many disastrous failures to prepare food as there have been in all early attempts to work up a true mental pabulum! As Heidenhain truly says, "It is the fate of every investigation into natural science that, after the establishment of a series of connected facts which can be objectively observed, an hypothesis must be established which brings these facts into causal connection with one another." And this hypothesis must be necessarily more or less tentative at first, until verified or disproved by further experiments; a working hypothesis, in fact, which shall collect together for the present, into a compact and assimilable form, all the individual facts, and suggest fresh experiments the necessity for which would probably have not otherwise been perceived. It is in this light—as indeed I have before implied—that I wish my interpretations to be read; and if in succeeding articles I may appear to be advancing too confidently theories for which some readers may think the present evidence altogether too insufficient, I will, in anticipation, refer them to this preliminary disclaimer. It is far more simple and less cumbersome to explain this once for all than to preface every individual hypothesis with "Let it, for the purposes of the present enquiry, be considered probable *that* ——"! After this candid

* Entom. p. 223.

confession I shall consider myself very badly treated if any readers accuse me of dogmatism or illicit assumption; and as to the appropriateness or otherwise of such working hypotheses, I may remind them that these articles were headed "Preliminary Notices,"—being indeed merely an account (published at this somewhat early stage for reasons explained in the first section) of preliminary experiments on British Lepidoptera, by way of preparation for a considerably more extensive enquiry.

Now before considering the actual experiments, we shall, I think, do well to clear the ground of one or two matters, rather than plunge at once in *medias res*. These articles are entitled "On the Chemistry of Insect Colours," and there has, so far, been allowed perhaps a tacit assumption that there is a chemistry of—all—insect colours. Whereas there is not. It is superfluous for me to remind readers of 'The Entomologist' that it has long since been opined by various naturalists that in many cases the colours of insects are due,—not to any pigment at all, but to the minute physical structure of the surface; and this class of colours may be conveniently, though somewhat loosely, referred to as physical colours, in distinction from chemical or pigment colours. Readers of Wallace's delightful book, 'Tropical Nature,' will remember that he alludes on several occasions to these "physical colours,"—especially with reference to Lepidoptera and other insects. For instance, he conjectures that "many of the glossy or metallic tints of insects, as well as those of the feathers of some birds," are due to interference colours; and states also that "The iridescent colours of the wings of dragon-flies are caused by the superposition of two or more transparent lamellæ, while the shining blue of the purple emperor and other butterflies, and the intensely metallic colours of humming-birds, are probably due to fine striæ."* Then, again, Mr. Cockerell† quotes Dr. Dimmock as opining that the white of *Pieris* and the silver of (e.g.) *Argynnis* are both due to physical structure, and not to any pigment. So that clearly naturalists have long been fully awake to the fact that in discussing the colours of insects (and other groups) we must discriminate between the chemical and the physical colours; although I am not aware that there has so far been much formal evidence forthcoming concerning these physical colours.

* On the other hand Wallace, I think, goes too far in stating that pigmental colours "comprise all the opaque colours of flowers and insects." I should call *Pieris*-white, for instance, a very opaque colour; and among *Heterocera* opaque colours are abundant which are—so far, that is, as I can at present determine—no pigment colours.

† Entom. xxii. 126-7.

‡ At least, not until very lately. I see, however, by a recent article in 'Nature,' that Dr. Hodgkinson has published a paper on the "Physical Cause of Colour," recording experiments tending to show whether the colour is caused by a structure of thin plates or of fine lines. I have, however, not yet had an opportunity of consulting Dr. Hodgkinson's paper.

This being so, there is some consolation to me for the (chemically) negative and disappointing results of so many of my experiments, in the reflection that they have at any rate served to confirm the opinions previously put forth on wholly different grounds by various naturalists. But to this point we will return subsequently.

Now, with a view to classifying lucidly the explanations that I shall have to give of the various colour phenomena under discussion, I wish at this point to propose a subdivision of these *physical* colours into several classes, although in so doing it is not easy to avoid making somewhat arbitrary distinctions; but it must be remembered that these subdivisions are proposed with special reference to these experiments. From Wallace's view, as expressed in the statement* that "the colours which we perceive in material substances are produced either by the absorption or by the interference of some of the rays which form white light, Pigmental or Absorption colours," &c., I must dissent; for this appears to me to be both an incomplete account and also to confuse two different classes—or, if you like, sub-classes—under the one term of absorption colours. The subdivision now proposed is as follows:—

First, *Interference* colours — whether of films or fine lines (striated surfaces). Inorganic examples are, — of films, soap-bubbles, the colours of molten metals, iridescent glass, stagnant water, and so on: of striations, the colours of mother-of-pearl,† "shot"-silk, &c.

Secondly, *Reflection* "colours" — other than interference colours. Of course all interference colours *as seen on the wings of birds and insects*‡ are reflected; but under this class-heading I am denoting such "colours" as are produced by simple reflection without the interference colours due to films or striations. Under this subdivision we shall be chiefly concerned with the "colours" of white-winged species, and also apparently of the "metallic" markings displayed by *Argynnis*, *Plusia*, &c. It is almost superfluous to instance as inorganic examples such objects as white paper, and the like large category, for the former; whilst as regards "metallic or quasi-metallic reflection," it has been also pointed out to me that, besides the coloration of polished metals in this manner, another example is afforded by the colours of aniline dyes under certain circumstances,—*e.g.*, when a drop has been spilled on the neck of the bottle, and dried there.

* 'Tropical Nature,' pp. 182-3.

† If a mother-of-pearl shell be impressed upon wax, the colours will be found transferred to the wax also; clearly demonstrating them to be due to a surface structure.

‡ Unless we looked *through* the gauzy wings of Neuroptera, &c., in which case we should see similar (unreflected) interference colours in positions complementary to the reflected colours seen from above.

Thirdly, it seems to me that we ought to rank those colours which are due to the partial or total *absorption* of light rays, whereby either a complementary colour or a simple black is produced. It may well seem at first blush that this third class is altogether erroneous and superfluous, since the definition of it is the definition of the pigment class. For all that we mean by a pigment—strictly—is a compound of such molecular structure that it absorbs many or few, or all or none, of the light rays, producing complementary colours, or black, or white. Nevertheless, I feel it necessary to constitute this third class in order to accommodate colours that are apparently caused by absorption, but cannot anyhow be chemically affected as one would expect pigment colours to be. If asked to instance an *inorganic* colour of this class, I could not do better than point to a lump of coal as a thoroughly characteristic example; and no doubt various other examples will occur to my readers.

Of course I am fully aware how very arbitrary and artificial—in final analysis—any distinction between chemical and “physical” colours is. In the first place, all these sub-classes may be said to overlap more or less: as already pointed out, reflected colours and interference colours approach one another; similarly reflected and absorption colours also approximate in character*; and, lastly, all pigment colours are only a special case of absorption colours. Moreover, ultimately, all colours are physical; that is to say, the only objective antecedent of the sensations that we call colour is to be found in the inconceivably minute molecular structure of matter, which so affects the ether vibrations as to produce in us the sensations of colour. In this sense, therefore, all colours—whether pure pigment colours, or interference colours, or absorption colours—are *physical*. But, nevertheless, it is eminently convenient to distinguish between, on the one hand, chemical colours, due to pigments, which may be isolated and utilised as such; and, on the other hand, “physical” colours, in the usual restricted and well understood use of the term. Always bearing in mind, then, the caution just posited, we may freely speak of chemical and physical colours, and need not trouble just now to determine where, in absorption* colours, the physical ends and the chemical begins. After all, this is no more perplexing or arbitrary than the division between the overlapping sciences of Physics and Chemistry,—a division that is purely arbitrary and subjective, but very convenient for the purposes of human study. Only Nature knows nothing of any such distinction.

Let us, then, during the rest of this discussion, assume that there are at least four classes of colours:—

- | | | |
|-------------------------|--------------|---|
| 1. Chemical or Pigment. | 2. Physical. | <ul style="list-style-type: none"> a. Interference colours. b. Reflected colours. c. Absorption colours. |
|-------------------------|--------------|---|

* See preceding footnote.

My objection, then, to Wallace's treatment would be that he has taken no cognizance of these absorption (and reflected) colours; whereas it appears to me possible to interpret a large number of my experimental results only on the assumption that many colours are due to "absorption," and belong to Class 2 c. And in thus speaking I have especially in view the very "unsatisfactory" (to repeat my previous designation) colours—black, brown, grey, and such like. For the rest, reflection colours (Class 2 b) will, as already pointed out, include all the whites and silvers, and metallic colours generally. Class 2 a (interference colours) includes some blues, metallic greens, &c. Reds are entirely pigment colours; so probably are yellows, though we have some knotty points to settle here, as will have been observed, no doubt, by any of my readers that have examined in detail the tables of results. Greens, too, and chestnuts, and (some?) blues, are also pigment colours.

(To be continued.)

AN ADDITION TO THE PLUSIIDÆ OF BRITAIN.

BY RICHARD SOUTH.

(PLATE III. FIG. 6.)

PLUSIA MONETA.

Noctua moneta, Fabr. Mant. Ins. ii. 162; Hübn. Eur. Schmett. fig. 289; Dup. Léop. Fr. vii. pl. 139, fig. 2; Frey. Beit. ii. pl. 71.

Noctua flavago (*Argyritis*, text), Esp. Schmett. iv. 218, pl. 112, fig. 1.

Noctua napelli, Vill. Ent. Linn. p. 347, pl. v. fig. 21.

Polychrysis moneta, Hübn. Verz. Schmett. p. 251, No. 2492.

Plusia moneta, Treit. Schmett. v. 3, 158; Guen. Noct. ii. p. 332, No. 1146; Walk. Cat. Lep. Het. p. 889; Staud. Cat. p. 125, No. 1764; Kirby, Eur. Butt. & Moths, p. 261; Hofm. Gross.-Schmett. Eur. p. 111.

Expanse, 1 in. 9 lines. Fore wings pale golden tinged with grey; transverse lines and venation on the disc, brown; the costal half of central third suffused with brown; first line double, curved and indented at the median nervure, second line starts obliquely from the costa, then turns inwards and forms a series of curves to the inner margin; between these lines is a narrow brown band which is angulated at the 2nd median nervule; before the apex is a brown oblique streak from costa to outer margin, where it terminates in a broader longitudinal dash of the same colour; below this brown dash is a broad stripe of pale brown, with a few black dots between the nervules; beyond, the outer margin is tinged with violet. In the central area is a silvery ring, separated by the median nervure from a larger curved mark of the same colour; this last is intersected by the 1st median nervule, and both have a yellowish tinge. Hind wings pale brown, suffused with fuscous,

especially on the outer third; lunule and central line blackish, but the former is not always distinct. Fringes pale brown preceded by a dark line.

One example taken in Sussex by Mr. Christy, who found it in his moth-trap on the 2nd of July last (Entom. 254).

Kirby says the larva is grass-green with white dots, a dark line down the back, and a white one along the sides. Feeds on monkshood (*Aconitum napellus*) from autumn to June. Guenée remarks that DeVillers found a pupa between leaves of the food-plant. The imago is on the wing in June and July according to Hofmann, but Guenée gives July and September.

I am obliged to Mr. W. M. Christy, of Watergate, Emsworth, for the loan of this most interesting addition to our small band of native Plusiidae. As the larva and its food-plant are known, it is to be hoped that the species may be detected here in the earlier stages also.

The figure represents Mr. Christy's specimen, but the description has been drawn up from a fine bred example in Mr. Leech's European collection.

DISTRIBUTION.—Germany (except N.W.); Switzerland; South-east France; Normandy; Andalusia; Piedmont; Austria; Hungary; Poland; Finland; Central and South-east Russia; Altai; East Siberia; England.

FIVE DAYS' COLLECTING IN NORMANDY.

By J. H. LEECH, B.A., F.L.S., &c.

ON Friday, July 18th, I made another excursion to Tancarville, accompanied by Mr. South and Mr. H. McArthur. During the time we spent in the locality the weather was not altogether unfavourable for entomological work. The days were warm enough; there was a fair amount of sunshine and but little rain, except on the morning of the 21st. Although the night were certainly cold at times, the meteorological conditions were a distinct improvement on those which obtained during our former visit.

A full list of the species captured on this occasion is appended. Those species met with as imagines during our previous visit, and enumerated in the June list (*ante* p. 225), are indicated by an asterisk.

LIST OF LEPIDOPTERA TAKEN AT TANCARVILLE, JULY 19TH—23RD, 1890.

RHOPALOCERA.—*Pieris brassicae* and *P. napi*. *Argynnis euphrosyne*, one male specimen. *Vanessa c-album*, one. *V. polychloros*. *V. urticae*. *Limenitis sibylla*. *Apatura iris*, represented by two wings found on the road below castle. *Melanargia galatea*. *Epinephele ianira*, one female example has the usual fulvous markings of fore wings replaced by whitish except the costal portion of submarginal band. *E. tithonus*. *E. hyper-*

anthès. Cænonympha arcania. C. pamphilus. Thecla ilicis. Polyommatus phlaeas. Lycæna icarus. L. argiolus. Hesperia thauwas. H. lineola, the latter very common. H. sylvanus.**

HETEROCERA.

SPHINGES.—*Smerinthus populi. Macroglossa stellatarum. Trochilium apiformis. Thyris fenestrella. Zygæna filipendulæ*, not common.

BOMBYCES.—*Nola cucullatella. Calligenia miniata.* Lithosia mesomella. Gnophria quadra. Euchelia jacobæ.* Callimorpha dominula*, common in a wood at the back of the hotel. *Arctia caia*, one larva. *Spilosoma fuliginosa*, one full-grown larva. *Hepialus humuli*, one female example. *Psilura monacha*, pupæ on tree trunks. *Bombyx neustria. Saturnia pavonia*, one larva feeding on stunted willow in the quarry below castle. *Dicranura vinula*, full-grown larva. *Notodonta dictæa*, one larva. *Drynobia velitaris*, one female specimen. *Phalera bucephala*, larvæ. *Thyatira derasa. T. batis.* Cymatophora octogesima (= ocularis). C. or. C. duplaris.* The Cymatophoridæ were taken at sugar, as also were the following:—

NOCTUE.—*Acronycta psi.* A. leporina. A. aceris. A. megacephala. A. rumicis.* A. auricoma. Leucania lithargyria*, variable. *L. pallens. Hydræcia nictitans. Xylophasia lithoxylea. X. hepatica. Apamea didyma (= oclea)*, many forms. *Miana strigilis.* Caradrina taraxaci (= blanda). Rusina tenebrosa.* Agrotis suffusa. A. exclamationis.* A. ripæ. Noctua triangularum. N. brunnea.* N. baia*, some nice forms. *Triphæna pronuba.* Miana maura. Calymnia trapezina. C. affinis. Euplexia lucipara.* Hadena oleracea. Gonoptera libatrix. Plusia gamma.* Phytometra viridaria. Herminia derivalis and Hyphenodes costæstrigalis* were taken on the wing, and larvæ were obtained of *Diunthæcia albigula. Cucullia verbasci.* and C. lychnitis?*

GEOMETRÆ.—*Epione apiciaria. Angerona prunaria. Selenia bilunaria v. juliaris. Crocallis elingvaria. Eugonia quercinaria (= angularia). Boarmia repandata.* Hemitea strigata (= thymiaris). Acidalia disetata. A. dilutaria. A. remutaria. A. strigilaria*, not uncommon. *A. inornata. Timandra amatoria. Cabera pusaria.* C. exanthemata.* Abraxas grossulariata.* Lomaspilis marginata.* Emmelesia alchemillata. Eupithecia impurata. Hypsipetes sordidata (= elutata). Melanippe sociata. M. galiata*, larvæ. *Campptogramma bilineata.* Phibalapteryx tersata. Cidaria testata. C. dotata (= pyraliata). Eubolia limitata (= mensuraria). E. bipunctaria*, a rather dark form. *Anaitis plagiata.**

PYRALIDES.—*Aglossa pinguinalis. Scoparia cembræ.* Nomophila noctuella (= hybridalis). Pyrausta aurata (= punicealis). Herbulis cespitalis. Endotricha flammealis. Scopula olivialis.* Botys ruralis. Ebulea crocealis.* E. verbascalis. E. stachydalis.*

PTEROPHORI.—*Oxyptilus hieracii? Mimæseoptilus bipunctidactyla. Leioptilus scarodactylus. Acipitilia baliodactyla.*

CRAMBI.—*Crambus perlellus. C. tristellus. C. culmellus. Ithyia semirubella. Rhodophæa tumidella.*

TORTRICES.—*Tortrix podana. T. cratægana. T. xylostæana. T. rosana. T. heparana. T. ribeana. Peronea aspersana. Penthina gentiana. P. marginana. H. dealbana.* Spilonota rosæcolana. Aspis udmanniana. Sericoris lacunana. Euchromia purpurana. Orthotania striana.* Sciaphila subjectana.* Grapholitha penkleriana.* G. gemi-*

nana. *Batodes angustiorana*.* *Ephippiphora brunnichiana*.* *E. trigeminana*. *Carpocapsa grossana*.* *Dicrorampha politana*.* *D. petiverella*.* *Catoptria fulvana*. *C. citrana*. *Symæthis oxyacanthella* (= *fabriciana*).* *Eupæcilia dubitana*. *E. hybridella* (= *carduana*). *Xanthosella hamana*.* *Chrosis alcella* (= *tesserana*).*

TINEÆ. — *Phibalocera quercana*. *Dasycera olivierella*. *Acrolepia granitella*.

Several species of other Orders were taken, and these Mr. Billups has very kindly determined and reported on as follows:—

Coleoptera were again met with, and in some cases captured in considerable numbers; as there are some 29 species not mentioned in the June list of captures, I thought it perhaps might not be uninteresting to record the additions. They are as follows:—In the Carabidæ, *Pterostichus madidus*, F., and *Harpalus puncticollis* Pk., two specimens of each, the Staphylinidæ having a solitary specimen of *Creophilus maxillosus*, L., to represent this large family. Two specimens of *Necrophorus mortuorum*, F., and one of *vespillo*, L., with four of *Silpha thoracica*, L., and two of *S. quadripunctata*, L., represented the Silphidæ. *Epuræa æstiva*, L., in some numbers, with *E. deleta*, Er., *Meligethes æneus*, F., and *M. rufipes*, Gyll., represented the Nitidulidæ. Two specimens of *Halysia 14-guttata*, L., were the only species met with in the Coccinellidæ. The Scarabæidæ had as types three specimens of *Onthophagus taurus*, L., and several of *Sericea brunnea*, L. The Lagriidæ had numerous representatives in its solitary genus, *L. hirta*, L., several specimens of *Anaspis pumila*, Gyll., doing duty for the Mordellidæ. In the Cerambycidæ several specimens of the fine *Rhagium mordax*, Fab., were taken, as also *Strangalia maculata*, Poda., and *Grammoptera tabacicolor*, DeG. To the Chrysomelidæ, however, the majority of species taken belong, amongst these were a solitary specimen of *Crioceris brunnea*, Fab.; several of *Timarcha monticola*, Fab.; three specimens of *Chrysomela hyperici*, Forst.; one of *C. varians*, Fab.; seven of *C. tristis*, Fab.; and a number of the very beautiful *C. speciosa*, L., in nearly all shades of colour. There were also several specimens of *Lina ænea*, L., and *Gastrophysa viridula*, DeG., *Crepidodera rufipes*, L., and *C. helexines*, L., bringing up the total to 29 species. Hymenoptera had also several representatives in *Prosopis dilatata*, Kirby, and *P. communis*, Nyl.; *Andrena trimmerana*, Kirby, and *A. nitida*, Fourc.; *Anthidium manicatum*, L., and *Chelostoma florissomne*, L.; the Ichneumonidæ being represented by *Ichneumon vaginatorius*, L., and *Centeterus confector*, Gr. There were also two species of Hemiptera taken, *Piezodorus litucatus*, Fab., and *Dasycorus hirticornis*, Fab., and several specimens of Oniscidæ in *Armadillo vulgaris*, L.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTODONTA DICTÆA IN AUGUST.—I found a full-fed larva of *N. dictæa*, on 8th July; it went under ground, 10th July, and emerged on 12th August. I think this is rather unusual. I also took a full-fed *Notodonta ziczac* about the same time, and it emerged two days previous to the above.—M. CRASKE; Newacott, Bridgerule, Devon, August 15, 1890.

[*N. dictæa* is perhaps not so regular as *N. ziczac* in assuming the imago condition twice during the year, but both species are double-brooded. In each case the autumn larvæ of one year produce imagines in May or June of the following year; from these are derived the larvæ, found in June and July, which attain the perfect state in August.—ED.]

BLACK VARIETY OF LIMENITIS SIBYLLA.—While collecting at Holmesley, on Friday, July 18th, I captured a fine specimen of the black variety of *Limenitis sibylla*.—R. E. JAMES; Trays Hill, Hornsey Lane, N.

PINKISH VARIETY OF ARCTIA CAIA.—I have taken in my garden (July 23) a female of *Arctia caia* with the white of the forewings deeply suffused with pink, and have another, not so deep, taken a few years ago at Portsmouth.—W. T. PEARCE; 101, Mayfield Road, Gosport.

CROCALLIS ELINGUARIA VAR. TRAPEZARIA (?).—I took from a Chester gas-lamp, on the night of August 20th, a fine specimen of *Crocallis elinguaris*, without the median transverse band on the fore wings. There is a broad pale-brown band on the hind margin of each upper wing, bordered by a narrow white line on the basal side. The discoidal and other spots are as usual, with the exception of the hind wings, which are spotless. Is this the variety *trapezaria*?—J. ARKLE; Chester. [*Trapezaria* is said to be smaller, darker, and the central fascia broader.—ED.]

ANTICLEA CUCULLATA (SINUATA) AT CHICHESTER.—I captured a fine specimen of this beautiful little Geometer, which I beat out of a hedge on 25th July. Although I do not see it mentioned by authors, I should say that the larvæ feed on other species of *Galium* besides *Galium verum*, as this plant does not grow within miles of the locality where I took this specimen. The moth is, I believe, new to the Sussex list. *Galium mollugo* grows in profusion in the hedges round about. I was much tempted to keep the moth (a female) alive for eggs, but she was in such beautiful condition, apparently having only just emerged, I thought that in all probability she must be a virgin, and so converted her into a specimen forthwith, to grace my cabinet, I trust, for many years to come.—JOSEPH ANDERSON, Jun.; Chichester.

LARENTIA OLIVATA AND EUPITHECIA SUBCILIATA AT RICKMANSWORTH.—On July 31st I took two specimens of *E. subciliata* off palings beneath a maple tree in Rickmansworth Park, and one example of *L. olivata* was disturbed from herbage growing on a bank by the road-side. There were a few commoner things on the wing; but the only insect that could be said to be plentiful was *Aphomia sociella*, which was met with on palings, and later on flying along hedgerows.—RICHARD SOUTH.

CUCULLIA ABSYNTHII NEAR BARMOUTH.—In reply to Mr. Chamberlain's note under the above heading, I shall be very curious to hear

whether he found the food-plant near Arthog; if not, I think I can solve the problem. Last year, in order to rear *absynthii*, I took up several roots from this place and planted them in my garden, on the opposite side of the estuary to Arthog, about one and a half or two miles as the crow flies. This would be nothing of a flight for *C. absynthii*. I make this suggestion, as I know of no *absynthium* growing wild in that neighbourhood.—CHAS. E. PARTRIDGE; The Castle, Portland.

NOCTUA DEPUNCTA AND TETHEA RETUSA IN DEVON.—Among common insects taken at sugar, on July 2nd, was a fine specimen of *N. depuncta*; and from a larva taken off sawfly, on June 15th, I have reared *T. retusa*.—M. CRASKE; Newacott, Bridgerule, Devon, August 6, 1890.

DILOBA CÆRULEOCEPHALA ON PRUNUS LAURO-CERASUS.—In answer to Mr. W. E. Butler (Entom. 263), I have many times found larvæ of *Diloba cæruleocephala* feeding on common laurel, and have reared the imago from specimens so found.—WALDEGRAVE; 13, Montagu Place, Montagu Square.

I found, this spring, half a dozen larvæ of *Diloba cæruleocephala* on a cherry laurel. They were in their last skins, and there was nowhere near any other possible food for them. How they can eat it without setting free the poison (that of our laurel-bottles), or that they are proof against it, is equally difficult to understand. I have seen an odd Tortrix larva on laurel occasionally; I think they affect rather oldish leaves.—T. A. CHAPMAN; Hereford.

FOOD-PLANTS OF PLUSIA IOTA.—Mr. Edmonds informs me that the larva of *Plusia iota* will eat buckthorn, blackthorn, willow, sawfly, poplar, birch, plantain, groundsel, dock, carrot, and walnut! I have already recorded hawthorn as a food (Entom. 204), and with these additions it would appear that the larva is polyphagous, and anything but fastidious in the matter of diet.—RICHARD SOUTH.

SIREX GIGAS IN HANTS.—I saw a fine specimen of *Sirex gigas*, on Tuesday last, the 5th inst., flying about a camp at Rushmoor, near Aldershot, but was unable to capture it, as, after a good chase, it disappeared in a pine wood, from whence it had probably come.—CHARLES MAXTED; 7, Church Terrace, Castelnau, Barnes, August 11, 1890.

SIREX GIGAS IN DURHAM.—On the 8th of August last, I noticed this insect flying about fir trees at High Force. On the 11th of the same month, Mr. R. Calvert, of Bishop Auckland, had a living specimen brought to him. This example was captured in a solicitor's office in the town, and was said to have crept from the folds of a lady's dress.—RICHARD SOUTH.

LEPIDOPTERA OF KENT: INFORMATION WANTED.—As I expect very shortly to move to Shorncliffe Camp, I should be extremely obliged for any information regarding Folkestone, Deal, Dover, or the Marshes, as far as Lepidoptera are concerned.—C. E. PARTRIDGE; The Castle, Portland.

COLLECTING ON THE NORTHUMBERLAND COAST.—Alnmouth is a small town, situated on the coast, about a mile from Bilton Junction, easily accessible from London by day or night trains, the journey occupying about eight hours. Sand-hills stretch for miles on both sides of the town; there are also some nice salt-marshes about the river-mouth. Lepidoptera were very abundant at sugar on several nights, fifty and sixty specimens on one patch of sugar being not at all unusual. The flowers of the common

rush were very attractive; so also was ragwort, which grows in rich masses. Although no important rarities were captured, some very fine varieties of common species were secured, which well repaid the trouble taken. Amongst others, the following species occurred:—*Lycæna icarus*, beautifully bright vars. of female. *Cidaria immanata*; a nearly unicolorous slaty form. *Eubolia limitata* (= *mensuraria*); very dark and strongly marked. *Melanippe montanata*. *Larentia didymata*. *Leucania pallens*, *L. impura*, *L. straminea*, *L. lithargyria*. *Apamea leucostigma* (= *fibrosa*); very variable. *Miana bicoloria* (= *furuncula*); all shades of colour, from nearly white to brown. *Cerigo matura* (= *cytherea*). *Agrotis valligera*, *A. tritici*; very bright. *Triphæna comes* (= *orbona*), *T. orbona* (= *subsequa*), *T. pronuba*; some nice vars. *Noctua baia*, *N. umbrosa*, *N. xanthographa*; vars. *Cleoceris viminalis*; a beautiful bright form. *Xylophasia monoglyphia* (= *polyodon*); from very pale to quite black. I was only able to spend four days collecting, but I think the locality would well repay careful work.—J. H. LEECH; 29, Hyde Park Gate, S.W., August 10, 1890.

AN ADDITION TO THE LEPIDOPTERA OF SHETLAND.—Whilst spending a few days at Lerwick, in June, I captured on the shores of Bressay Island a few specimens of *Dicrorampha plumbagana*. The weather was cold and wet, and insects remarkably scarce, the only Macro I took being *E. curzoni*. I was in hopes of finding that the Diptera and Hymenoptera of the North of Scotland were darker than those from the South of England, like the Lepidoptera and Trichoptera, but such does not seem to be the case; the only fly that appears to show any variation from southern forms is *Rhagio scelopaceus*. The principal flies I saw in the Shetlands were *Pedicia rivosa*, *Tipula oleracea*, *T. lunata*, *Limnobia nigrina*, *Erioptera obscura*, *Chrinonus dolens*, and *Eristalis intricarius*; *Bombus smithianus* being the only bee.—C. W. DALE; Glanvilles Wootton, August 2, 1890.

URTICATING HAIRS OF LEPIDOPTERA.—As a further contribution to the literature of this subject I may add my experience with the cocoons of *Cnethocampa processionea*. A few days since I was engaged in clearing out some cocoons of this species from a breeding-cage in which the moth had been reared some years ago. I had not long commenced my job when I felt a severe stinging about my eyes and back of the neck. To obtain relief, as I thought, I bathed my face, &c., with warm water; but this only seemed to increase the irritation. As soon as I could obtain some strong liquid ammonia from the nearest chemist, I applied this to the parts affected. The effect was very rapid, relief being experienced immediately, and I was quite free of the trouble in a short time.—H. McARTHUR; 35, Averill Street, Fulham.

THE CHESHIRE PLAGUE OF CATERPILLARS: A MYTH.—I am able to state, not merely from personal observation, but from exhaustive enquiry, that no extraordinary appearance of caterpillars has occurred in Cheshire this year. Berries—perhaps more especially gooseberries—have been generally a heavy crop; apples and pears will be much below the average; while “stone” fruit must be put down as almost a failure. A Kelsall correspondent describes the situation as follows:—“The paragraph quoted,” he writes (see ‘Entomologist’ for August, 1890, page 260), “is like many others we meet with in newspapers: some penny-a-liner imagined it! Fruit trees were damaged by frosts in May, not by cater-

pillars." Personally, I have found larvæ in Cheshire to be scarcer than for many years past. On the 15th of August I went to Delamere Forest for a few hours' beating; from oak the result was *nil*; from birch I only beat a solitary caterpillar of *Amphidasys betularia*, one of *Hylophila bicolorana*, about half a dozen *Cabera pusaria* instead of scores, and three or four more of common Geometers. This result I put down to the year's prevalence of cold and wet weather. To the same cause I attribute an extraordinary mortality among the caterpillar inhabitants of my flower-pots and breeding-cages.—J. ARKLE; Chester.

ODONTURA PUNCTATISSIMA ABUNDANT.—I never saw this Orthopteron so common as it is now in our woods. — C. W. DALE; Glauvilles Wootton, August 2, 1890.

RHIZOTROGUS SOLSTITIALIS AT CHESTER.—This beetle was very plentiful close to Chester, on the Dee banks, last July. Up to last year it was unrecorded in the list for Lancashire and Cheshire, when it was discovered in the locality just quoted. To those unacquainted with the insect it may be interesting to say that this beetle looks exactly like a small cockchafer (*Melolontha vulgaris*), a species to which it is allied.—J. ARKLE; Chester.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—August 6th, 1890.—Capt. Henry J. Elwes, F.L.S., Vice-President, in the chair. Major-General George Carden, of Surbiton, Surrey, and the Army and Navy Club, Pall Mall, S.W.; and Sir Vauncey Harpur-Crewe, Bart., of Calke Abbey, Derbyshire, were elected Fellows. Prof. Meldola exhibited a male specimen of *Polyommatus (Chrysophanus) dorilis*, Hufn., a common European and Asiatic species, which had been taken at Lee, near Ilfracombe, in August, 1887, by Mr. Latter. At the time of its capture Mr. Latter supposed the specimen to be a hybrid between *Polyommatus phleas* and one of the "Blues," and had only recently identified it as belonging to a well-known species. Mr. Stainton, Mr. Jenner Weir, and Colonel Swinhoe made some remarks on the specimen, and commented on the additions to the list of butterflies captured in the United Kingdom which had been made of late years. Mr. W. F. H. Blandford exhibited, and made remarks on, four specimens of *Athous rhombeus*, Ol., bred from pupæ, recently collected by himself in the New Forest. The Rev. Dr. Walker exhibited a large collection of Coleoptera which he had recently made in Iceland. The following genera, amongst others, were represented, viz.:—*Patrobus*, *Nebria*, *Byrrhus*, *Aphodius*, *Philonthus*, *Barynotus*, *Chrysomela*, *Agabus*, *Creophilus*, and *Carabus*. Mr. Champion, Dr. Sharp, and the Chairman made some remarks on the collection. Capt. Elwes exhibited three species of the genus *Atossa*, Moore, three of the genus *Elcysma*, Butl., and three of the genus *Campylotes*, West.,—all from the Himalayas and North-eastern Asia. The object of the exhibition was to illustrate the remarkable differences of venation in these closely-allied forms of the same family.—Colonel Swinhoe, Mr. Warren, Mr. Moore, and others took part in the discussion which ensued. Mr. P. Crowley read a paper entitled "Descriptions of two new species of Butterflies from the West Coast of Africa," and exhibited the species, which he proposed to name respectively *Charaxes gabonica* and *Cymothoe marginata*. He also exhibited several other new

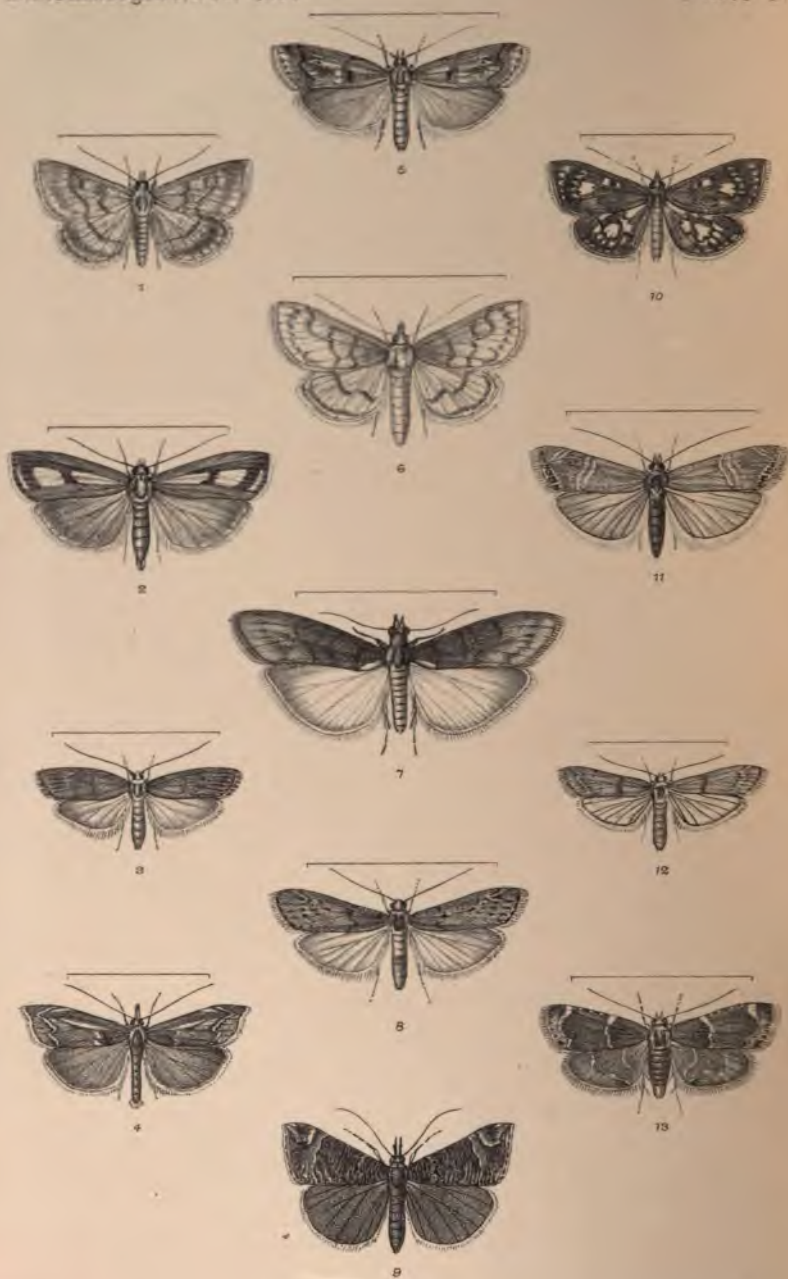
species from Sierra Leone, which had been recently described by Miss Sharp in the 'Annals & Mag. of Nat. Hist.'—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—July 24th, 1890. J. T. Carrington, F.L.S., President, in the chair. Messrs. R. Augustine Clark, M.A., A. Hewk, and W. G. Bryant, were elected members. Mr. Turner exhibited *Noctua festiva*, Hb., from Hampstead, and a variety of the larvæ of *Biston hirtaria*, Leach, the usual brown pigment not having developed. Mr. Joy, *Collix sparsata*, Hb., from Wicken Fen, and larvæ of the same species, which he had fed on knot-grass. Mr. Wellman, a short series of *Calymnia affinis*, L., bred from larvæ taken at Chattenden; also living larvæ of *Dianthæcia nana*, Rott., *D. cucubali*, Fues., and *D. carpophaga*, Bork., from Caterham. Mr. R. Adkin, a bred series of *Moma orion*, Esp., from the New Forest. Mr. Moore, a dark variety of *Arctia caia*, L., the larvæ from which it was bred having been taken at Rotherhithe. Mr. West, *Apamea ophiogramma*, Esp., and remarked that he had found the larvæ of this species feeding in his garden at Streatham on ribbon grass. Mr. Carrington exhibited botanical specimens from Southend, Essex.

August 14th.—W. H. Tugwell, Vice-President, in the chair. Mr. H. W. Street, was elected a member. Mr. Wellman exhibited *Emmelesia unifasciata* Haw., bred from larvæ obtained at West Norwood in 1888, the species having been two years in pupa. Mr. South, *Hypsipetes sordidata*, Fb., one being strongly banded with red and having a reddish patch at the base of the primaries, bred from a larva found in Buckinghamshire; in another the same markings were reproduced in a colour almost white; the larva from which this was bred was found in Devon, and both larvæ were fed on sallow. With reference to the first example Mr. South stated that he had had some hundreds of this species through his hands, but had never met with this particular form before. Mr. South also showed an unusually dark form of *Larentia didymata*, L., from Durham, where it had been exceedingly common. Mr. R. Adkin, *Cleora glabraria*, Hb., bred, from the New Forest, and *Coccyx tædella*, Clerck., taken on the occasion of the Society's excursion to Leatherhead. Mr. Moore, two varieties of *Abraxas grossulariata*, L. Mr. Tugwell, on behalf of Mr. G. T. Porritt, larvæ of *Eupithecia extensaria*, on substituted food, *Artemisia abrotanum*. Mr. Tugwell also exhibited a box of *Arctia caia*, L., of which he stated he had bred some hundreds this season and only obtained one variety, the wings of which did not expand. Mr. Hawes, living larvæ of *Argynnis selene*, Schiff., and *A. euphrosyne*, L., which were about to hibernate. Mr. Jenner Weir, living larvæ of *Psyche villosella*, Och., and drew attention to the different kind of material from which the cases had been constructed; one singular case was formed entirely from pieces of rush, each about one quarter of an inch in length, and although he had had this specimen about two months it appeared not to have added to its case; most of the cases had been commenced with the fragments of grass and heath afterwards used. He also showed one larva from which he had removed the entire case, and had supplied it with strips of coloured paper, from which in a few days it had formed a new habitation; the coloured paper had also been used by another specimen, which had not been deprived of its case. During the last two months most of the specimens had doubled the length of their cases; the case was always made from the feeding or proximal end, and never from the distal end, from which latter the imago

emerged. In one instance, where he had made the experiment of cutting off the distal end, the larva, being unable to repair the breach, forsook the case and made another habitation. Mr. Bouttell exhibited a pale form of *Zygana filipendulæ*, from Leigh, Essex, and *Hesperia lineola*, taken at Southend in 1882, which he had discovered in his series of *H. thauwas*. Mr. Turner, *H. lineola*, taken on the Society's excursion to Leigh, and Mr. Nussey the same species, including a very pale example from Shoe-buryness. Mr. Tugwell expressed an opinion that the species occurred on the salt marshes, and those taken on the hills were specimens that had been blown from the salt marshes. Mr. South said the species was plentiful at Tancarville, some two or three hundred yards from the River Seine, in a limestone quarry, and there was no character of salt marshes whatever; Mr. Barker said he had taken a specimen in Sussex, on the chalk. Mr. T. R. Billups, Coleoptera from Tancarville, taken by Messrs. Leech and South; a specimen of *Chrysomelidæ rutilans*, Woolaston, taken alive in the Borough Market, October last, and stated that the species was a native of the Canary Islands, and had probably been imported with potatoes from those Islands; *Glypta rubicunda*, Bridg., a species of Ichneumonidæ new to Science, bred by Mr. Elisha from a larva of *Argyrolepis maritima*; a spider's nest from which he had bred *Hemiteles fulvipes*, Gr.—the nest was taken by Mr. R. Adkin, at Leigh, Essex; a cluster of cocoons formed by *Apanteles spurius*, Wsm., attached to a sprig of heather, and from which the living insects were emerging in some numbers; also a specimen of the white rose bedeguar gall and its maker, *Rhodites rosæ*, L., with one of its parasites, *Calimome bedeguaris*, L. Mr. Cockerell, larvæ of *Eriocampa cerasi* Pach., feeding on leaves of pear, received from Banstead, where they were doing considerable damage; hellebore was recommended as a remedy. Mr. Cockerell said the species was common in America as well as in this country. Mr. C. A. Briggs, specimens of *Cicada montana*, Scop. Mr. Perks, a specimen of *Bagous tempestivus*, Hbst., from Leigh, Essex. Mr. B. W. Adkin, a spray of oak leaves almost entirely covered with the galls of *Neuroterus fumipennis*, Hartig. Mr. Billups, *Helix incarnata*, Miller, and a white variety; *Succinea putris*, L., and the variety *linnoidea*, Bandon. Mr. Cockerell then read a list of animals and plants observed in the Leigh district, between Southend Pier and Hadley Castle, July 25th, 26th, and 27th, 1890, showing a total of 160 species and 22 varieties.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—July 21st, 1890. The President, Mr. W. G. Blatch, in the chair. Mr. W. Harrison, of Harborne, was elected a member. Mr. G. W. Wynn showed *Charocampa porcellus*, taken at Sutton Coldfield last June. Mr. G. H. Kenrick showed pupæ of *Satyrus semele*, and a larva of *Eriogaster lanestris*. Mr. R. C. Bradley showed a short series of *Sesia crabroniformis*. Rev. C. F. Thornewill showed a series of *Thecla rubi* from Cannock Chase, two specimens of which possessed a light brown spot in each of the fore wings. Mr. W. G. Blatch showed *Sesia culiciformis* from Wyre Forest. Mr. P. W. Abbott showed unusually large *Larentia cæsiata* taken on Exmoor. Messrs. E. W. Wynn and E. C. Tye gave an account of a short holiday spent collecting Lepidoptera in Wyre Forest, last June. Among other interesting species taken are *Melanippe hastata*, *Eupisteria oblitterata* (= *heparata*), *Tephrosia luridata* (= *extersaria*), *Agrotis strigula* (= *porphyrea*), &c. — COLBRAN J. WAINWRIGHT, *Hon. Sec.*



West, Newman
(Horace Knight) } lith.

Deltoids Pyralides & Crambi.

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[No. 829.

ADDITIONS TO THE BRITISH LIST OF DELTOIDS, PYRALIDES, AND CRAMBI, SINCE 1859.

By RICHARD SOUTH.

(PLATES III. & IV.)

Continued from p. 278.

CRAMBI.

CRAMBIDÆ.

CRAMBUS ALPINELLUS, *Hübner*. (Pl. IV. fig. 4.)

BRITISH REFERENCES:—

Crambus alpinellus, Knaggs, Ent. Mo. Mag. viii. p. 110; Ent. Ann. 1872, p. 118, pl. i. fig. 4; B. White, Scott. Nat. i. p. 135; Weston, Entom. x. p. 117; Tugwell, Entom. xiv. p. 214; Atmore, *op. cit.* xviii. p. 172; Ragonot, E. M. M. xvii. p. 15; Doubl. List, Suppl. p. 2; South, Syn. List, p. 19; Leech, Brit. Pyral. p. 73, pl. viii. fig. 2.

“Phoxopterygiform; of an ashy brown colour, with a white, longitudinal, middle streak. This streak sends out a branch towards the inner margin before the middle of the wing; beyond the middle it is intersected by an obliquely-placed mark of the ground colour; towards the apical margin there is a strongly angulated zigzag line” (Knaggs).

Introduced by Dr. Knaggs, October, 1871.

BRITISH LOCALITIES.—Southsea; Deal; Norfolk Coast.

DISTRIBUTION.—South-western France; Germany; Hungary; Livonia; Switzerland.

Note.—Zeller says that this species occurs in sandy grassy places in the pine-forests of Germany and Hungary. Ragonot mentions dry sandy pasture-lands, where broom, heath, and *Artemisia campestris* grow. In a recent communication Mr. Pearce, of Gosport, says he has been informed by Mr. H.

ENTOM.—OCT. 1890.

2 A

Moderately that *C. alpinellus* occurs on the shore all round Portsea and Hayling Islands. The imago flies in July and August; but the larva appears to be unknown.

CRAMBUS VERELLUS, Zinck. (Pl. III. fig. 11.)

BRIT. REF.:—

Crambus verellus, Vaughan, Ent. Mo. Mag. ix. p. 88; Knaggs, Ent. Ann. 1873, p. 42, pl. i. fig. 1; Weston, E. M. M. xi. p. 117; Entom. x. p. 118; Griffith, *op. cit.* xiv. p. 20; Ragonot, E. M. M. xvii. p. 15; Doubl. List, Suppl. p. 2; South, Syn. List. p. 19; Leech, Brit. Pyral. p. 74, pl. viii. fig. 4.

"Allied to *falsellus*, but is smaller, darker, and has rounder wings" (Knaggs).

Introduced by Mr. Howard Vaughan, September, 1872.

BRITISH LOCALITIES.—Folkestone; Cambridge.

DISTRIBUTION.—France; Germany; Sweden; Galicia; England.

Note.—The specimen taken by Mr. C. A. Briggs at Folkestone on the 21st of July, 1872, furnished the first record of this species in Britain; but, after making the announcement, Mr. Vaughan detected two other specimens, one in Mr. S. Stevens' collection, and another in that of Mr. Ramsay Cox.

M. Ragonot observes that, according to Anton Schmid, "the undescribed larva feeds in moss on the branches of old plum, apple, and poplar trees; but Dr. Rössler finds the moth also in fir-woods where the ground is covered with moss."

CRAMBUS CONTAMINELLUS, Hübn. (= *CANTIELLUS*, Tutt).

BRIT. REF.:—

Crambus contaminellus (Hübn. 59), Stainton, Manual, ii. p. 183; Tugwell, Entom. xix. p. 75 (woodcuts); Tugwell & Fletcher, l. c. p. 163; Tutt & Fletcher, Entom. xx. p. 52; Doubl. List, p. 18; South, Syn. List, p. 20; Leech, Brit. Pyral. p. 83, pl. ix. fig. 10.

Crambus cantiellus, Tutt, Entom. xix. pp. 52 (woodcut), 73, 131.

BRITISH LOCALITIES.—Deal; Shobernyness; Blackheath (formerly).

Note.—This is not an addition to the British list, but as the nomenclature of the species has been disturbed, it was thought advisable to include it in the present list.

CRAMBUS SALINELLUS.

BRIT. REF.:—

Crambus salinellus, Tutt, Entom. xx. p. 56.

C. contaminellus, Buckler, Ent. Mo. Mag. xv. p. 38 (larva); Porritt, Entom. xix. p. 130 (larva).

"Expanse, ♂ 8—11 lines, ♀ 9 lines to 1 in. Anterior wings

broad, costa regularly arched, apex not very acute; colour wainscot-brown, more or less dusted with black scales; in some specimens the wings are very much suffused; two transverse lines, the first starts from about the middle of the costa, curves towards the hind margin for a short distance, then runs obliquely across the wing towards the body, and meets the inner margin at about one-third from the base; the second commences on the costa nearly midway between the first line and apex, curves towards the hind margin near the upper part, forms an angle pointing towards the thorax at about two-thirds across the wing, and then curves towards the anal angle; a black streak crosses the centre of the wing, longitudinally, from the thorax to the first line, beyond which it is sometimes visible. Posterior wings pale grey in colour; in some specimens there are traces of a dark line parallel to the hind margin" (Tutt).

Introduced by Mr. Tutt, March, 1887.

BRITISH LOCALITIES. — Preston; Isle of Sheppey; Higham (Kent); Deal; Sussex Coast.

Note.—Although others appear to have been aware of it, Mr. Tutt was the first to direct our attention to the fact that we had two distinct species going under the name of *contaminellus*. Unfortunately, in his first attempt to set the matter straight, Mr. Tutt fell into error by re-naming Hübner's *contaminellus*. Subsequently, however, he had the advantage of the valuable opinions of Messrs. Tugwell and Fletcher, and, basing his conclusions on the information afforded him by those entomologists, he sunk his *cantiellus*, and gave the name of *salinellus* to the species previously confounded with *contaminellus*.

CRAMBUS MYELLUS, Hübner. (Pl. IV. fig. 3.)

BRIT. REF. :—

Crambus myellus, Saunders, Proc. Ent. Soc. Lond. 1868; Knaggs, Ent. Ann. 1869, p. 126, pl. i. fig. 3; Ragonot, Ent. Mo. Mag. xvii. p. 16; B. White, E. M. M., viii. p. 70; Scott, Nat. i. p. 143; Entom. xvi. p. 213; Warrington, E. M. M. viii. p. 113; Ellison, Entom. xviii. p. 245; E. M. M. xxv. p. 431; Baker, E. M. M. xix. p. 241; Doubl. List, Suppl. p. 2; South, Syn. List, p. 20; Leech, Brit. Pyral. p. 79, pl. ix. fig. 2.

"Fore wing acute, yellow-brown, paler at the base and inner margin. The pearly-white central streak is *twice* divided by fuscous, the third part being linear. Cilia grey, with a few white streaks. Centre of head and thorax white. Expanse 12-13 lines" (White).

Introduced by Mr. Edward Saunders in 1868 at the December meeting of the Entomological Society.

BRITISH LOCALITIES.—Aberdeen; Glen Tilt; Braemar; Ran-noch.

DISTRIBUTION.—Central Europe; Finland; Armenia.

Note.—Flies in June and July, frequenting the borders of woods. The larva has been described by Treitschke, who says that it is earthy-brown, with head and plate on second segment darker brown; feeds in galleries under moss on stones in March.

EROMENE OCELLEA, Haw. (Pl. IV. fig. 11.)

BRIT. REF.:—

Palparia ocella, Haw. Lep. Brit. p. 486.

Oncocera ocella, Steph. Cat. ii. p. 217; Wood, Index, 1480.

Araxes ocella, Steph. Ill. Brit. Ent. Haust. iv. p. 316.

Crambus ocella, Stainton, Ent. Ann. 1862, p. 110.

Eromene ocella, Hearder, Ent. Mo. Mag. iii. p. 139; Gregson,

Entom. iv. pp. 249 and 263; Webb, E. M. M. xvi. p. 101;

Ragonot, E. M. M. xvii. p. 17; Ellis, Lep. Fauna Lanc.

& Chesh. p. 76; Doubl. List, Suppl. p. 2; South, Syn.

List, p. 20; Leech, Brit. Pyral. p. 87, pl. x. fig. 2.

Expanse, 1 inch. Fore wings brownish, tinged with ochreous; beyond the middle two oblique leaden lines enclose a band of the ground colour, another line of the same hue is sharply angulated below apex, and then runs parallel with outer margin; beyond this line is a series of jet-black spots with metallic centres. Hind wings fuscous grey, fringes whitish.

BRITISH LOCALITIES.—Folkestone; Dumfries; Cheshire; Glamorganshire.

DISTRIBUTION.—Central Europe; Madeira; N. W. Asia Minor; Syria; Palestine.

Note.—The specimen described by Haworth in 1812 was captured in the suburbs of London. Subsequently this example passed into Mr. Stephens' collection, where it still remains, in the insect-room of the Natural History Museum, South Kensington. For fifty years Haworth's type remained the only known British specimen of *E. ocella*, but in 1862 a second specimen was announced; four years later a third capture was recorded, a fourth in 1868, and three others in 1869. Mr. S. Webb took a specimen in August, 1879, and perhaps others may have been captured during the past twenty years, but I cannot find that they have been recorded. From the fact of some of the British specimens having been taken in February and March it has been assumed that the species hibernates, but there is only circumstantial evidence to support this view. *E. ocella* appears to be a South European and North African insect; its occurrence in England at all is probably accidental, but in any case it is difficult to understand how the imago could manage to survive the cold of a British winter. In Tangiers Mr. Leech has taken the species in February, flying at dusk on the sand-hills, but there is no reason to suppose that the species hibernates so far south.

PHYCIDÆ.

MYELOIS PRYERELLA. (Pl. III. fig. 9.)

BRIT. REF.:—

Trachonetis (?) *pryerella*, Vaughan, Ent. Mo. Mag. vii. p. 130; Knaggs, Ent. Ann. 1871, p. 90, pl. i. fig. 3; Doubl. List, Suppl. p. 2; South, Syn. List, p. 20; Leech, Brit. Pyral. p. 89, pl. x. fig. 7; Griffith, Proc. Ent. Soc. 1889 (March).
Myelois ceratoniæ var. *pryerella*, Ragonot, E. M. M. xii. p. 30.

Fore wings pale greyish white, shaded towards the base with dark grey. First line, which is undulating and oblique, passing from the inner third of the costa to the middle of the inner margin, shaded with dark grey; this shading continues in less degree to the second line. The stigmata indicated by darker grey markings. Second line denticulate, nearly parallel with hind margin; subterminal line very wavy and faintly visible on the paler ground colour. Hind margin dotted with dark grey. Cilia pale grey. Hind wings silky white, narrowly bordered with fuscous. Expanse 10 to 11½ lines.

The above is an abridgement of Mr. Vaughan's description.

Introduced by Mr. Howard Vaughan, November, 1870.

BRITISH LOCALITY.—London.

Note.—The late Mr. Eedle took a specimen of this insect in his garden near Hackney in September, 1864, and another in October of the same year, but these remained unidentified until 1870, when the late Mr. Henry Pryer captured an example in Tooley Street, August 27th, and Mr. Vaughan one on the 10th of September. M. Ragonot, after having examined "one of the original types," is of opinion that *pryerella* is only a bleached form of *ceratoniæ*. Mr. A. F. Griffith has very kindly lent me his specimens, which I have carefully examined and compared with *ceratoniæ*, and I must say that I quite concur in the opinion expressed by M. Ragonot. Of *M. ceratoniæ* but little was known until Mr. A. B. Farn met with it in a London warehouse between the years 1884 and 1887 (*vide* Ent. Mo. Mag. xiii. p. 281). Fig. 9 (Pl. III.) represents one of Mr. Griffith's specimens.

MYELOIS CIRRIGERELLA, Zinck.

BRIT. REF.:—

Myelois cirrigerella, Meyrick, Ent. Mo. Mag. xi. p. 237; Blandford, List of Marlborough Lep. p. 19; South, Syn. List, p. 20; Ragonot, E. M. M. xxii. p. 30.

"Expanse 9 lines. Palpi moderate, porrected. Head and thorax bright yellow. Fore wings glossy, rather pale brownish ochreous, yellower towards base, immaculate. Hind wings grey. Cannot be confounded with any other British species. When alive it has a very smooth and glossy appearance, and the yellow thorax is conspicuous" (Meyrick).

Introduced by Mr. E. Meyrick, March, 1875.

DISTRIBUTION. — Germany; Galicia; Livonia; Dalmatia; England.

Note.—On the 30th of June, 1874, eight or nine specimens of

this species came to light in the neighbourhood of Marlborough, Wilts. There is no other record of the occurrence of the insect in Britain.

HOMEOSOMA NIMBELLA, Zell., var. *SAXICOLA*.

BRIT. REF.:—

Homœosoma saxicola, Vaughan, Ent. Mo. Mag. vii. p. 132; White, l. c. p. 231, op. cit. viii. p. 68; Knaggs, Ent. Ann. 1871, p. 92; Gregson, Entom. v. p. 396; Doubl. List, Suppl. p. 2; South, Syn. List, p. 20; Ragonot, E. M. M. xxii. p. 26; Leech, Brit. Pyral. p. 91, pl. x. fig. 13.

"Expanse, 7—8 lines. . . . Fore wings grey, with a fuscous tint. The costal stripe bifurcates about the inner third into two other stripes of unequal size, the larger of which is continued along the costa until within a short distance of the apex, and the lesser is continued as a streak to beyond the middle of the wing. There are two or three small black dots situated about the junction of the inner and middle third, and two or three other small dots beyond the middle of the wing. . . . Hind wings shining grey; cilia paler."—(Vaughan.)

M. Ragonot says that none of the British *nimbella* he has seen are quite like continental specimens, and adds, "*Saxicola* is generally larger; the fore wings are more distinctly white on the costa, and the rest of the wing is of a pure ochre, not at all powdered with black scales as in the type of *nimbella*. The name of *saxicola* should be retained to distinguish the English variety of *nimbella*."

Introduced by Mr. Vaughan, November, 1870.

Note.—The earliest known examples of this insect were bred in 1867, from larvæ found in flower-heads of chamomile in the Isle of Man, September, 1866. In 1870 Dr. Buchanan White found larvæ common in the flower-seeds of several species of Compositæ, on the shores of the Solway Firth. He says that the larva, when full grown, spins a cocoon, but does not assume the pupa state until the spring. The insect has also been obtained at Clifton, Dover, and Folkestone.

HOMEOSOMA CRETACELLA, Rössler.

BRIT. REF.:—

Homœosoma senecionis, Vaughan and Buckler, Ent. Mo. Mag. vii. p. 131; Knaggs, Ent. Ann. 1871, p. 91, pl. i. fig. 2; Porritt, Entom. xix. p. 211; Doubl. List, Suppl. p. 2; South, Syn. List, p. 20; (*H. cretacella*, Röss.), Ragonot, E. M. M. xxii. p. 26; Leech, Brit. Pyral. p. 93, pl. xi. fig. 2.

"Expanse, 8—9 lines. Fore wings: ground colour shining greyish white, the inner half being suffused with a warm fuscous tint. There are no indications of a first line. About the middle of the wing are two, and in some cases three, dark dashes. At about the junction of the middle with the outer third are two

distinct black dots. Beyond these dots is the second line, which affords a most distinctive character to the species; it is straight, and composed of black dots running in a direction oblique to the hind margin. The hind margin is more or less distinctly dotted. Cilia grey, with a faint fuscous tint. Hind wings shining grey."—(Vaughan.)

This species is closely allied to *H. nebulella*, and also to *H. binævella*; some entomologists, in fact, have considered it to be a var. of the last named. It is, however, separated from both its nearest allies by its smaller size, and may be at once distinguished by the straight, oblique, dotted submarginal line.

LARVA.—"Deep purplish brown; ventral surface slightly tinged with olive; head, and plate on second segment, deep blackish brown and brilliantly polished; the rest of the body rather shining, with a faint violet gloss."—(Buckler, abridged.)

Introduced by Mr. Vaughan, November, 1870.

BRITISH LOCALITIES.—Stapleton; Norwich; Dover; Folkestone; Southend; Chattenden (Leech).

DISTRIBUTION.—Central and Western Germany; England.

Note.—The earliest specimens noted in this country were captured in Essex some time during the month of May, 1870. In June of the same year larvæ were found feeding in the stems of ragwort.

EPHESTIA DESUETELLA, Walk. (Pl. III. fig. 5.)

BRIT. REF.:—

Nephoteryx desuetella, Walk. Cat. Lep. Het. Suppl. p. 1719; (*Ephestia*), Meyrick, Ent. Mo. Mag. xxiv. p. 8.

Ephestia figulilella, Gregson, Entom. v. p. 385; Ragonot, E. M. M. xxii. p. 25.

Ephestia ficulella, Barrett, E. M. M. xi. p. 271; Porritt, op. cit. xvii. p. 44 (larva); South, Syn. List, p. 20; Leech, Brit. Pyral. p. 95, pl. xi. fig. 6; Ellis, Lep. Faun. Lanc. and Chesh. p. 77.

Expanse, 7—8 lines. "Fore wings very narrow at the base, strongly arched beyond the middle. Costal lappet narrow, with a tuft of long hair-like scales laid *lengthwise* beneath the wing. Fore wings smooth and shining, pale slate-colour, with a small ill-defined ochreous patch at the base of the dorsal margin. The first transverse line is at one-third the length of the wing from the base, pale grey, externally edged with dark grey spots, and nearly perpendicular to the margins. Second line pale grey, often obsolete, oblique, angulated above the middle, slightly edged on both sides with grey dots. Faint dashes of ochreous lie longitudinally between the wing-rays. Hind wings whitish, edged with brownish, cilia white. ♂ with one ochreous tuft at the base. Antennæ thickened beyond the basal joint, then constricted and slightly bent, and again thickened before assuming the usual

simple form. Head, antennæ, palpi, and thorax slate-grey; abdomen brown."—(Barrett.)

Mr. Porritt has described the larva as pale, pinky, flesh-coloured, with distinct pink lines; head and mandibles dark sienna-brown; frontal plate darker brown. Feeds in December on figs.

Introduced by Mr. Gregson, September, 1871.

BRITISH LOCALITIES.—London; Liverpool. In dried fruit warehouses.

Note.—Mr. Gregson first described this *Ephestia* as British under the name of *figulilella*. Four years later Mr. Barrett re-described the species, and changed the name to *ficulella*. Mr. Meyrick, however, has shown us that both names must now give way in favour of the much earlier one of *desuetella*, Walker, the type of which is from Australia. The species will probably be found wherever stocks of dried fruit are kept.

EPHESTIA CAHIRITELLA, Zell. (Pl. IV. fig. 12.)

BRIT. REF.:—

Ephestia cahiritella (Zeller, Stett. Ent. Zeit. 1867, p. 384)

Ragonot, Ent. Mo. Mag. xxii. p. 24.

Ephestia passulella, Barrett, E. M. M. xi. p. 271 (1875);

Buckler, E. M. M. xix. p. 104 (larva); Porritt, *op. cit.*, p. 142; South, Syn. List, p. 20; Leech, Brit. Pyral. p. 95, pl. xi. fig. 4; Ellis, Lep. Faun. Lanc. and Chesh. p. 77.

Expanse, 6—7 lines. "Fore wings narrow, especially at the base; costa less arched than in the preceding species. Costal lappet with a broad tuft of scales. Fore wings pale fuscous, with a yellowish tinge; scales large and coarse, and easily rubbed off. First transverse line at one-third the length of the wing, fuscous, ill-defined, straight, and very slightly oblique. Second line parallel with the hind margin, pale, faintly edged with fuscous, often nearly obsolete. Usual two dots on the disc oblique, fuscous, hardly discernible; cilia yellowish fuscous. Hind wings white, with scattered fuscous scales, and a faint brown margin; cilia white. ♂ with one ochreous tuft at the base. Head, antennæ, palpi, thorax, and abdomen, yellowish fuscous. Antennæ simple beyond the thick basal joint."—(Barrett.)

Introduced by Mr. Barrett, May, 1875.

BRITISH LOCALITIES.—Grocers' warehouses in London and many other towns.

DISTRIBUTION.—Cannes; Vienna; Egypt; Siberia; Japan; England; Chili.

Note.—Mr. Porritt says the species is double-brooded. He bred imagines in September and October from ova deposited by a female in the previous June. M. Ragonot observes that some of the larvæ hybernate, and change to pupæ towards the end of

May, the imago emerging in June. Mr. Hodgkinson has met with the larvæ of this *Ephestia* in a mill at Preston, where they were feeding on oil-cake.

(To be continued.)

ABUNDANCE OF LEPIDOPTERA IN NEW ZEALAND.

By W. W. SMITH.

THE study of Mr. Adkin's paper, "On the occasional abundance of certain species of Lepidoptera in the British Islands" (Entom. 177), has afforded me much pleasure, particularly as I have devoted much time for some years past to the same subject in New Zealand. The main facts adduced by Mr. Adkin to account for the occasional abundance of certain species in the British Islands will not, as I will presently explain, fully apply to the same phenomenon in New Zealand. These are what that gentleman termed "The migration and the local causes theories." The British Islands and New Zealand are both insular areas; but while the former is separated only by a few miles from the European continent, the latter is situated at least one thousand miles from the continent of Australia. Both areas are subject to an occasional abundance of certain species of Lepidoptera. On the causes of this phenomenon in New Zealand, I propose to offer some explanatory observations; whether the hypothesis I now advance to account for the great abundance of Lepidoptera during the past season will be accepted, I cannot say; it is one not at present clearly understood by naturalists; I allude to certain seasons of exceptionally luxuriant growth and floriferous display of the indigenous flora; such seasons are peculiarly favourable to the development and economy of many species of Lepidoptera, and the two last seasons in New Zealand have been of this description. Less snow fell in the higher Alps during the winters of 1888 and 1889 than for the previous twelve years, while the meteorological records show a corresponding mildness of the temperature, and a considerable diminution of north-west or snow-melting spring winds. The summers following, each have been dry and hot, and naturally adapted to the life-habits of Lepidoptera; all species I observed during the past season, from the earliest spring-appearing species to those which appeared in late autumn, emerged in great numbers, and were all beautifully-developed insects. This phenomenon was not limited to Lepidoptera, as the numbers of many species representing other orders appeared on a corresponding scale.

Mr. Adkin mentions the case of *Vanessa cardui* and *Plusia gamma* as having occurred in great numbers in the British Islands, in cold wet seasons, when other species were much less common.

The same phenomenon occurred here with the former species in 1884, but the previous season was a very floriferous one, and several species of Noctuæ appeared in unusual numbers (Entom. xxii. 37). In reviewing the various causes Mr. Adkins remarks:—"If, therefore, we are to account for the cases of occasional abundance by purely local influences, we must find some irregularity in the working of Nature." In referring to the great abundance of the same species in the past season in New Zealand, Mr. G. V. Hudson says (Entom. xxiii. 133):—"I am inclined to believe that the abundance, or the reverse, of a given species is largely determined by certain conditions of existence, with which we are at present most imperfectly acquainted, and that, in the case of a periodical insect like *V. cardui*, these conditions only recur occasionally." If the occasional abundance of this species in Britain be explained by migration from the Continent, it could only follow certain causes which favoured the great increase of the species the previous year, and no doubt identical with the causes which produce its recurrence in New Zealand at intervals of several years. The migration theory, as explained by Mr. G. V. Hudson, can have no bearing on the question in New Zealand: indeed, I have long been convinced that the great numbers of certain species which occasionally appear in New Zealand, especially among the more specialized groups, invariably follow seasons of luxuriant growth of the native flora. I would, however, mention that the economy of many species of New Zealand Lepidoptera are quite unknown at present; but when such has been fully worked out by entomologists, it will, no doubt, be discovered to be the principal cause. The same facts, of course, will apply to continental areas; but the faunas and floras of such are not so rapidly modified as in insular areas, while it clearly shows that the larva of certain species of Lepidoptera are wholly dependent on certain pabulum for their subsistence, the fuller development of which, in mild or otherwise favourable seasons, again increases, and fully explains their appearance in vast numbers in the succeeding season. The last two mild winters, and hot summers in succession, with the favourable influence on the native flora, unquestionably shows that such are likewise extremely favourable to the development of much of our Lepidopterous fauna: it has shown the same results with several introduced species belonging to other orders, which have also increased at an unprecedented rate during the last summer. Every year the indigenous flora and fauna of New Zealand are becoming more and more modified, and it is difficult—and in many cases impossible—to record faithfully the effects of such on certain species of native Lepidoptera, especially on fast-expiring forms; yet it is cheering to the naturalist to witness an occasional season fruitful to the native flora, and a consequent regeneration of many species of our ancient Lepidopterous fauna. I regret that I have no

knowledge of the effects of the snowfall, or the "fohn," in certain seasons, on the meteorological conditions or the flora of the European Alps; but the subject seems to me to require the fullest investigation, as bearing on the occasional abundance of Lepidoptera, and possibly would tend to explain the occasional abundance (by migration) of certain species in the British Islands: unmistakably these causes appear to be the chief factor, favouring the increase of certain species in the last two seasons in New Zealand. How long the renewal or increase of numbers will last remains to be observed. We are, again, almost through another mild winter, with light snowfall in the Southern Alps, the effects of which on our Lepidoptera will receive my closest attention in future.

East Belt, Ashburton, New Zealand, August 5, 1890.

NOTES ON *TÆNIOCAMPA OPIMA*.

By J. ARKLE.

NUMEROUS inquiries, by various correspondents, during the past two years, induce me to make the following observations upon an insect which, although clad in sober but glossy greys, I am disposed to call the Queen of the *Tæniocampæ*. My personal acquaintance with this local and beautiful moth centres exclusively in its well-known habitat at Wallasey. The egg is a miniature globe, with closely-set longitudinal lines "sculptured" from pole to pole. The little spheres are white when fresh laid, in April or May, and are clustered together on or near the tops of dead stems of ragwort, thistle, or dwarf rose. Other plants and shrubs may doubtless be included in this botanical list, but I prefer to speak from experience. I have never found the eggs on sallow, although the leaves of that plant are a favourite food in confinement. In two or three days the colour of the egg changes to brown. In a favourable season the batches are common enough, but, in the last two springs, ova of *T. opima* appear to have been comparatively scarce. On the 3rd of May—a beautifully clear and sunny morning—I went early to the sandhills for eggs wherewith to continue a most interesting study of this favourite moth. I soon found myself in good and unexpected company. Females of *Nyssia zonaria* were swinging, in the cool sea-breeze, on the long bents of the maritime grass. Their eggs were hidden away below in the junctions of bent and stem. Dozens of *Mesotype virgata* (*lineolata*), in silver-grey striped with dark brown, were resting on the short bedstraw. There were big violets about, with large white centres; beds of dwarf sallows, brilliant with yellow and odoriferous catkins; and here and

there a bloom on the burnet rose, with a scent almost equal to that of a Marechal Neil.

After a search of a couple of hours I came across two batches of *T. opima* eggs, on the top of dead ragwort. Their subsequent history is only too typical of the difficulties met with in rearing the perfect insect. I took eggs from each batch, as I have found in previous years that the moths reared from separate batches were distinctive,—that is, they were either the light-coloured type, or the dark variety figured in Newman's 'British Moths.' To still further put this experience to the test I took my eggs home, and kept them in separate tumblers (marked A and B), with the usual drop of water to prevent the shells getting too hard, gauze covering, elastic band, and square of glass. Although the ova from one batch were white when found, and those from the other brown, both sets of eggs hatched within a couple of days of each other, on the 12th and 14th of May. Six sallow leaves were divided between the glasses, whereupon the larvæ, as in manner wont, marvellously and at once hid themselves.

The caterpillar, when fully grown, is a richly coloured object. The head and anal segment are reddish; second segment reddish, but darker than the head; upper surface dark purple, beautifully mottled with yellow; along each side, immediately above the legs, is a broad yellow stripe; above this, and adjoining, is a broad, very dark, purple-black stripe, and immediately above this a narrow yellow line. A line, similar to the last mentioned, runs along the middle of the back or upper surface, from head to anal segment. The under surface is pale green; the legs and claspers are green, and inclined, at the terminations, to red.

When the caterpillar answers to this description, which it will do in July, it has reached its final stage. On July 12th about twenty out of the total of forty Wallasey larvæ were full-fed, and about to pupate; the rest had died off, chiefly in the preceding stage, and in that unaccountable way so familiar to collectors who attempt to rear the insect. Worse still, the survivors were already beginning to show the first symptom of a like destiny,—viz., a refusal to eat, varied by a few spasmodic bites at a leaf on being disturbed. They then began to "lose flesh," became flaccid, and died off one by one. My experience points most strongly to the low temperature and continued dampness of the past summer as the chief reasons for such a total collapse.

T. opima must have plenty of room in the larva state. There should be no more than six, or eight at the outside, on a surface of a square foot; there should be a liberal supply of fresh air and sallow; the soil to pupate in should be of the lightest, with a plentiful admixture—say half the bulk—of sea- or silver-sand: and yet I fear, even with all these advantages, the breeder must be content with a very small percentage of perfect insects.

Although I have reason to believe I have been exceptionally fortunate, I never reared more than half-a-dozen at a time.

Turning over my notes, I find the emergence of the bred insect to occur between the 5th and 21st of April. There is, I think, little fear of confounding this species with *T. instabilis*. In the type insect all the wings, but especially the fore wings, are a beautiful silvery grey, with a broad, transverse, median brown bar, which is widest at the costal margin. On the widest half of this bar the discoidal spots are clearly marked out in the same silver-grey. Parallel with, and at a short distance from, the hind margin, the wing is again crossed by a rich, direct, brown line, which is exteriorly bounded by another line almost white. The fringes, especially those of the hind wings, are almost white. The antennæ of the males show a slight pectination; the thorax is a little darker in shade than the ground colour of the wings, while the body is a shade darker than the thorax. In the second form of the moth the fore wings are a rich dark brown, the hind ones being slightly paler in tint. All the markings of the fore wings, however, are clearly visible, being intensified in colour. The body and thorax are also proportionately darkened. The coloration in both forms of *T. opima* is clear, distinct, and constant, in all the specimens I have seen, whilst *T. instabilis* can lay no claim to these characteristics.

I have never captured the perfect insect. Mr. Grearley, of Wallasey, tells me he has taken both forms—freely in exceptional years—at the sallow blossom.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

(Continued from p. 287).

V.—THE CHEMICAL ASPECT.

B.

After the explanatory digression of last month we are now free to consider the experiments on each colour individually: and first, then, as to BLACK, that prince of absorption colours. It is very commonly told us, on excellent authority, that we learn more from our failures than from our successes: possibly—but I have some doubts thereupon; and if the sentiment be expressed by way of consolation, it is surely the consolation of a Job's comforter. Anyhow, be that as it may, I am very certain that our failures do not teach us nearly so much as the successes that we *desired* would have done. To particularise, for my own case, it must be admitted that all my endeavours to learn something of the relationship between *black* colour in Lepidoptera

and the remaining colours have totally failed, and the failure has taught us almost nothing,—and in fact left the problem somewhat more perplexed than it originally was; whereas any success in the attempt to change the black colour by chemical reagents might have taught us a good deal. Nothing observed in the course of my investigations caused me, perhaps, more surprise or disappointment than this immovability of black. As has been shown, in every case it has resisted the action of every reagent, and although I experimented on the most various species, selected from widely different families and groups of Lepidoptera, yet in not a single instance did I effect any change. Under these circumstances, then, I think it is justifiable to conclude that the black of Lepidoptera is simply a physical absorption colour, and in no way due to pigment. It seems to me quite hopeless to further examine black species of Lepidoptera; and although, in pursuing this investigation among the exotic species sent to me, I shall continue to experiment on some black species, this will be done merely on principle and as a precaution, but with very slight hope of success. For although, in one sense, it may seem very rash to argue so confidently from the results yielded by a few dozen English species, yet the unbroken uniformity of these results and the representative character of the species are, I think, sufficient justification,—especially, too, when the significance of all the other results is considered.

Now a caution is requisite here. I most certainly would not assert that, because the colour of a given species cannot be chemically altered, therefore it is a physical colour and not a chemical: it may certainly seem surprising that a pigment should resist the action of powerful chemical reagents, but among the yellows we have pretty conclusive evidence that many *do*. If the table of results in yellow be consulted it will be seen that whilst some yellows are turned completely white, others are with difficulty affected, and some are *absolutely immovable*. Now I am not at present prepared to assert that *all* of these immovable yellows are pigment colours, although I shall presently show reasons for suspecting so; but I *do* contend for it as indisputable that some are. It is, I think, impossible to deny that the yellows of *Arctia villica* and *Callimorpha hera lutescens* are pigment colours, in the face of the close relationship of these species to the red pigmented species; but these two yellows are absolutely immovable. And if stronger evidence still be asked, we have it in the fact that whereas in almost all species red is rapidly changed to yellow by the reagents, the *change stops here*,* and although we have clearly a pigment in evidence, that pigment is sensitive to a

* I stated (Entom. 158) that in no instance had I succeeded in carrying a retrogressive change further back than one stage. Since that was written I have succeeded, in at least one striking instance, in getting a *second* retrogression: details will be given in their due place.

certain extent only, and after that is absolutely unassailable. I must, however, defer the full discussion of this interesting phenomenon until we are dealing with the yellows; my object in anticipating so far here being simply to show that apparently indubitable pigment colours may resist the action of all the reagents, and that therefore it is not legitimate to assume any given one or two colours to be physical, and not pigment, colours, because they are chemically unaffected. Nevertheless I do think the assumption fairly legitimate in the case of black, owing to the unbroken uniformity of the results and the absence of any single contravening result.

It should be remembered how very various are the species that have been examined, and how very different the relations of black in them to the other colours. It is not as though all these species were uniformly black, or as though in all of them black were found associated with the same second colour, or occupied the same position on the wings. If that were the case it might justly be said that the only legitimate inference would be that one black of wide occurrence was immovable, and not a pigment colour; whilst other blacks might exist that were pigment colours. But the case is not so. Consider how different in character are these blacks. In *Pieris* black occurs with *white*, as spot and tips; in *Melanargia galatea* and *Arctia caia* equally distributed with white; in *Spilosoma menthastris* as small dots on white, and similarly in *Amphidasys betularia*; and as larger spots on white in *Abrazas grossulariata*. Then, in combination with *yellow*, we find it as broad tips in *Colias* and *Triphæna*, and small spots on *Venilia macularia*. With the closely allied chestnut, too, it occurs as prominent tips, blotches, or ocelli, on *Argynnis*, *Melitæa*, *Vanessa cardui*, *Pararge megæra*, *Epinephele tithonus*, *Cænonympha pamphilus*, *Polyommatus phlæas*. Combined with *red* we find it in *Vanessa atalanta* as apparent base or ground colour, and very glossy; as almost tarry blotches on the hind wings of *Arctia*, and as groundwork again in *Catocala*. Combined with green it occurs in *Agriopis aprilina* and *Moma orion*, and with *grey* in *Acronycta psi*. So that here we have found it in various positions combined with all the chief colours (except *blue*); and, lastly, we have it *alone* as occupying the whole wing in *Tanagra atrata*, *Lycæna astrarche* v. *artaxerxes*, and *Epinephele hyperanthes*. But it is very remarkable that, however and wherever it occurs, it is always the same immovable black.

Now when we find any two or more pigment colours on the same species, the conclusion is almost irresistible that a genetic relationship must exist between them, if we can only discover it. If any one given colour be found in different species, combined in turn with all the other colours, a very especial interest attaches to it, since one naturally hopes to find in it a common basis by which to connect genetically all the other colours;

just such a cosmopolitan colour as this seemed *black* (as also white);* great was the interest with which I commenced working at it; and commensurately great my disappointment at the total failure. However different the reactions of its associated colours, black is always the same and unaffected—"Quod semper, quod ubique, quod ab omnibus." It is incredible to me that if black were a pigment colour it should be impervious to all my reagents—with whatever other pigment colours it be associated. I cannot believe that, in all the species just enumerated, pigments of half-a-dozen different colours should have been evolved, and in association with each a black pigment (which *must* be genetically somehow related to its companion, both being produced by the metabolic activities of the same system), always the same and always immovable. I conclude therefore, with considerable confidence, that black is no pigment colour, but a mere physical absorption result. Conformable with this is the fact that in the dozen or so instances where the black was a trifle affected, no *colour* was produced, but merely a *less black* black,—a faded, washed out, brownish black: and this is just what one might expect (if black be a physical colour) as the result of my reagent that partially destroyed the structure of the scales.† Black, then, I regard as being due—in Lepidoptera—to an arrangement of scales such as to cause a total absorption of all the incident light rays.‡ This absence of any black pigment is the more astonishing in face of its common occurrence in other orders of the animal kingdom. It would seem pretty clear that in most animals (*i. e.* Mammalia), in the normal animal as distinguished from the albino, there is a *black pigment* in the regions of the mouth, eyes, &c.§ and in the Negro there is a distribution of presumably black pigment over the whole skin surface. I am not aware how far *down* in the scale black pigments have been definitely found: possibly—it is

* In connection with this it should be pointed out that in my anticipatory theoretical reflections, before any experimental data were to hand, I had conjectured that several different blacks might exist,—so protean are its combinations. See Entom. p. 156.

† One final explanation could be hazarded. It has been suggested to me, by a friend, that in some species the colours may be enclosed in chitinous, transparent cases,—microscopic quills as it were,—and be thus rendered impervious to reagents. I am not, however, aware that this is anything more than a conjecture, and nothing in the appearance of the wings, when examined microscopically, suggests this to me. But anyhow it seems to me an utterly impossible proposition that black pigment is *always* enclosed in such chitinous receptacles, although combined with every other colour susceptible to chemical reagents, and therefore—presumably—not chitiously protected. I think we may with perfect safety ignore any such explanation as this of black's behaviour.

‡ But at the same time I am quite open to the reply that this theory, that black is no pigment colour, is only at best a probable assumption, and *not* strictly demonstrated. That is quite true; but I think it a *very* probable assumption, and at any rate we must accept it for the present as a working hypothesis.

§ *Vide* the interesting statements made by Wallace in 'Tropical Nature.' I should say, however, that Wallace does not explicitly state it to be a *black* pigment, though his expressions imply that. He merely says a "dark pigment."

a merest conjecture that may be utterly erroneous—they are found only among the higher groups of the animal kingdom, and not among the lower;* and in this connection one is tempted to adduce the fact that black flowers are almost, if not entirely, unknown. It would be somewhat interesting, therefore, to know whether or not black pigments are usually products only of a higher organisation than that of insects.

Then, again, there is another most interesting problem on which any definite chemical results from black might have thrown considerable light,—whereas, as it is, we are none the wiser. I refer to the phenomena of melanism. With regard to true melanism (as distinguished from melanochromism), it has been a great disappointment to me that nothing bearing upon this interesting subject has come from my work. It may be suggested that the phenomenon of melanism—i. e. of a black colour encroaching on and superseding other colours—is hardly to be reconciled with the supposed absence of any black pigment; whereas melanism were easily explicable if the ordinary pigments became transformed by some easily conceivable chemical change into a black pigment. But with regard to this objection I may point out that the development of melanism (in the absence of any black pigment) is no more difficult to understand (i. e. as a colour change—I do not speak of its ultimate cause) than the occurrence of black on *Argynnis* brown, on *Rumia* yellow, on *Pieris* white, and on *Lycæna* blue, &c. Neither is it, perhaps, even so great a difficulty as that of the black wing of *Vanessa atalanta*, which I believe to have been developed from an ancestral form closely similar to (or identical with?) *V. cardui*,† by a replacement of chestnut by black. In all such cases we must suppose that the “absorptive”—the black—scales have encroached upon the pigment-containing scales. Nevertheless, as a final caution, I must add that, since no melanic forms have come into my hands, I cannot positively state that in them also black is a non-chemical colour, and insensible to the action of reagents. I know only the conduct of ordinary normal blacks, and it is just possible that melanic forms may be due to a real pigment. For the determination of this point I must wait my opportunity; but I confess to having very little hope of finding, even in melanic forms, a black pigment.

In view of the complete unanimity of behaviour in the various black species experimented on, it seems unnecessary to animadvert on them individually, or group them according to the minor varieties of appearance or distribution of colour. As I have

* One must except, however, the sepia of the *Cuttle*. I have written the above paragraph only with considerable hesitancy, since it is purely conjectural, and may well be altogether erroneous.

† Further consideration of this topic I must defer until the brief section on the “Biological Aspect,” which it is anticipated will conclude these articles.

already pointed out, in these species worked upon, black is combined with each of the other colours in turn, and appears as ground colour, as spots, as blotches, as lines, as bands, and as tips, besides being in several instances the sole colour. As further exemplifying its chemical inaccessibility, I may especially instance the case of *Epinephele hyperanthes*. Since this species is by no means of a pure black, and is so closely allied genealogically to the very accessible chestnut-coloured species, I had entertained strong hopes that it might prove a welcome exception. But no! pure black or impure, *E. hyperanthes* is still black; and black is immovable—"Semper ubique et in omnibus!"

Erratum.—Page 286, omit footnote.

(To be continued).

THE WESTMANN ISLANDS.

By REV. F. A. WALKER, D.D., F.L.S., &c.

THE small group of islets known by this name (Vestmann-eyjar in Icelandic) is situate south of the S. coast of Iceland, between 63 and 64 deg. N. lat. and 32 and 34 deg. W. long. The names of the islets are as follows:—Drángar, Einarsdrágr, Erlendsey, Alsey, Geirfúglasker, Geldingasker, Sulusker, Hellirey, Bjarnarey, and Heimaey. By far the largest island, and the only inhabited one of the group, is Heimaey, or Home Island, distant possibly ten miles from the mainland; all the rest are rocks and skerries, or more strictly speaking, groups of rocks and skerries. These Westmann Islands derive their names from the ten Irish thralls (men of the West as opposed to Norwegians,—men of the East), who after murdering their Norwegian master, one of the earliest settlers, Hjorleifur, in his dwelling on the mainland, betook themselves, with his wife and all the women they could lay hands on, to Heimaey, and were slain in their turn, as an act of vengeance, by Ingolfur, Hjorleifur's brother, A.D. 874. In after years Algerine pirates made two descents on the islands, slew some, and carried off several into captivity, whence, after a long time, they were rescued by the king of Denmark.

It is by no means on every occasion that a steamer in passing the Westmann Islands is able to anchor off this group,—which is situate eighty miles east of the south-west point of Iceland,—in consequence of their exposed situation, high cliffs, and strong gales. Occasionally, also, it happens that a steamer, having come to anchor is, in consequence of the wind rising suddenly, obliged to continue her voyage without loss of time. Last autumn the Danish steamer from Reykjavik, being unable to make Heimaey owing to stress of weather, some ill-starred

inhabitants of that place were carried on to Seydisfjord (east coast of Iceland), where they had to remain throughout the winter and spring as well. Heimaey contains about 600 inhabitants, and its craggy promontory of Heima Klettur (Home Cliffs), surmounted by steep grassy slopes, is an island in stormy weather, as only united with the rest of the place by a low-lying neck of land covered with lava stones. Its tûn, or home-fields are divided by loose walls of lava stones, and there are boulders and crags of the same down to the water's edge, as there is scarcely any beach. *Statice armeria* flourishes profusely over the said tûn meadows and the grassy downs as well.

We arrived off the island at 4 a.m. on the 12th of June, and though feeling weak and faint, having kept my berth the whole of the previous day owing to the steamer's rolling heavily, I reflected that no entomologist had ever yet visited the Westmann Isles. It could be done, and it should be done. The additional difficulty that, owing to the heaving of the sea, the companion ladder was not lowered on this occasion now presented itself. There was no alternative but to slew one's self over the ship's side and so on to a rope ladder, which did not reach as far as the tossing boat beneath, and then drop heavily on to the flour-sacks which formed part of the cargo going ashore, and which I succeeded in reaching, after being somewhat drenched with the spray during my being rowed for about a mile through a choppy sea. The next thing was to make the best use of the short time allowed for the purpose of collecting, and my brief experience fully convinced me that Heimaey is quite as good a field for that purpose as the mainland of Iceland. My search continued for over two hours, in a spot where one has neither one's own nor the previous experience of anyone else to aid him in rapidly selecting the most suitable locality, when time is so precious. It goes without saying that Heima Klettur is whitened by the guano of innumerable sea-birds that frequent its craggy cliffs. Looking seawards from the grassy downs of Heimaey, a fine panoramic view is obtained of Eyjafjörður's sunny plateau; and the snowy peak of Hekla is also visible far inland. Heimaey's one settlement, Kaupstaðr, means the same as Copenhagen, — place of selling or merchandise. It possesses a church, and sends a representative to the Althing.

I append a list of the insects observed or captured:—

COLEOPTERA. — *Notiophilus bipustulatus*, *Nebria glynnhali*, *Patrobus hyperboreus*, *Calathus melanocephalus* v. *nubigena*, *Platysma vitreus*, *Amara quenselii*, *Creophilus maxillosus*, *Lesteva bicolor*, *Byrrhus fasciatus*, *Aphodius lapponum*, *Otiorhynchus monticola*, *O.* (? sp.), *Barynotus schonherri*, *Cryptohypnus riparius*.

DIPTERA.—*Calliphora erythrocephala*, *Scatophaga stercoraria*,

Sarcophaga mortuorum, *Heliophilus pendulus* (one specimen seen, not caught), *Tipula* (? sp.), *Musca domestica*.

HYMENOPTERA.—*Ichneumon* (1 sp. of *Lampronota*).

Dun Mallard, Cricklewood.

ALTERATION OF THE NAME OF AN INDIAN GEOMETRID MOTH.

In part vi. of 'Ill. Typ. Lep. Het.' p. 83, I referred a moth, described by me in 1880 as "*Abraxas conspersa*," to my genus *Icterodes*. It is a white-winged species, and (owing to the then crowded state of the drawer containing the genus *Icterodes*) I was unable to transfer it to its true position in the cabinet.

In part vii. I described one of Mr. Hocking's species, with yellow wings, under the name of *Icterodes conspersa*, not seeing any species of that name under the genus. I thus duplicated the name, and, as the most careful examination reveals nothing beyond a colour distinction between the two groups of *Icterodes*, it becomes necessary to alter the name of the later species, which I propose to call *Icterodes sparsa*. I have to thank Mr. Warren for calling my attention to this stupid *lapsus calami*.

A. G. BUTLER.

Brit. Mus. Nat. Hist.

ENTOMOLOGICAL PAPERS IN CONTINENTAL PERIODICALS.

By W. WARREN, M.A., F.E.S.

COLEOPTERA.

- On varieties of European Cicindelæ. H. Beuthin, Ent. Nach. 1890, iii. p. 36, v. p. 71, vi. p. 89, ix. p. 137.
- Revision of the species of *Triodonta*, Muls., belonging to the Palearctic Fauna. E. Reitter, Ent. Nach. v. p. 65.
- Monograph of the Pselaphidæ. A. Raffray, Revue d'Entomologie, 1890, vol. ix. pt. 1, p. 1—28; pts. 2, 3, 4, p. 29—124.
- Coleoptera from the Liu-Kiu Islands. H. v. Schönfeldt, Ent. Nach. 1890, xi. p. 168.
- Coleoptera occurring near Selinuntium. A. Palumbo, Sicilian Naturalist, 1890, vii. p. 166.
- New Species of Coleoptera:—(a). Two new water-beetles from Abyssinia. Dr. Schaufuss, Ent. Nach. iv. p. 62. *Dineutes olivaceus*, *D. jekelii*.—(b). Two new species of Tenebrionidæ from Tripoli. G. Quedenfeldt, Ent. Nach. p. 63. *Hidrosis elongatula*, *Asida nigro-opaca*.—(c). *Sternocera chrysis*, Fa. ? var. *singularis*. Kerremans, Proc. S.E. Belg. 1890, p. xix.—(d). New Histeridæ (continued). J. Schmidt, Ent. Nach. iii. p. 39, iv. p. 50.—(e). A new species of *Geotrupes* from Bosnia. V. Apfelbeck, Societas Entomologica, iv. p. 167. *Geotrupes brancsiki*.—(f). A new species of *Galeruci*

from Sumatra. A. Duvivier, Proc. S. E. Belg. 1890, p. xxxiii. *Mimastra platteewi*, Duviv.—Notes on Synonymy:—(i). *Haplosomoides* (n. gen.) *serena*, *Rhaphidopalpa serena*, Boh. Res. Eugen. p. 178. (ii). *Oides serrulata*, Duviv. Bull. S. E. Belg. 1884, p. cxxxii.; *O. quinquelineata*, Jac. Ann. Mus. Civ. Gen. ser. 2, vol. iv. 1886, p. 42. (iii). *Chtonsis suturalis*, Duviv. S. E. Z. 1885, p. 243; All. Bull. S. E. Belg. 1880, p. lxxvii. (iv). *Caudezea irregularis*; *Monolepta irregularis*, Rits. Tijd. v. Ent. 1875 p. 22; *Caudezea inconstans*, Duviv. Bull. S. E. Belg. 1889, p. cxxxvii.—(g). Four new species of Hispidæ from Central America. Aut. Duvivier, l. c. p. xxxvii. *Cephaloleia ornata*, *C. balyi*, *Amplipalpa lata*, *Charistena bergi*, Buenos Ayres.—(h). Seventeen new species of the genus *Stigmodera*, Eschsch. Ch. Kerremans, Pr. S. E. Belg. 1890, p. xl, with the following corrections of species already named:—*Stigmodera parryi*, Hope, to stand for *S. fusca*, Saund.; *S. laportei*, Kerr., to stand for *S. castelnaudi*, Thoms.; *S. fraterna*, Kerr., to stand for *S. distinguenda*, Thoms.; *S. flavidula*, Kerr., to stand for *S. flava*, Thoms.

CORRODENTIA.

On the occurrence of winged as well as wingless forms of *Pyrrhocoris apterus* and other Psocidæ. Herr Loens, Ent. Nach. 1890, i. p. 10.

DIPTERA.

On Cecidomyiids bred from flowers of Compositæ. J. J. Kieffer, Ent. Nach. 1890, pp. 27, 36.

HYMENOPTERA.

On the preparation (killing, setting, &c.) of Hymenoptera. Dr. Kriechbaumer, Ent. Nach. 1890, i. p. 1.

Revision and tabularization of genera and species of the Cryptinæ. Dr. O. Schmiedeknecht, Ent. Nach. 1890, vi. p. 81, vii. p. 97, viii. p. 113, ix. p. 129, x. p. 145.

Description of nest and parasite of the "bull-dog" ant of Australia (*Myrmecia forficata*, Fab.). Aug. Forel, Proc. S. E. Belg. 1890, p. viii.

Revision and description of the ants of Tunis and Eastern Algeria. Aug. Forel, Proc. S. E. Belg. 1890, p. lxi.

A new species of Tenthredinidæ. Dr. R. Cobelli, Verh. Z. B. Ver. Wien. 1890, p. 159. *Macrophya bertolinii*.

LEPIDOPTERA.

On the artificial sustentation of Lepidopterous pupæ. Dr. A. Troska, Societas Entomologica, 1890, pp. 1, 9, 17, 28, 43.

Remarks on *Morpho rhetenor*, Cr., var. *helena*, Stdgr. Dr. O. Staudinger, Ent. Nach. 1890, vii. p. 107.

Notes on the differentiation of three species of *Melitæa*,—*athalia*, Rott., *parthenis*, Bork., and *aurelia*, Nick. Fritz Rühl, Soc. Entom. v. pp. 11, 44.

Food-plants and distribution of *Danais chrysippus* and its allies. Dr. O. Hoffmann, Soc. Entom. iv. p. 167.

Macro-Lepidoptera of Zurich and neighbourhood. Fritz Rühl, Soc. Ent. iv. pp. 169, 185, v. pp. 28, 41.

Remarkable instance of triple mimicry. F. J. M. Heylaerts. Proc. S. E. Belg. 1890, p. xii. *Perina nuda*, Fab., a Liparid; *Chalia bipars*, Wlk., Psychid; *Kophene weyersi*, Heyl., a Psychid. These are so much alike

superficially that they can only be separated after a careful examination of the nervulation. N.B.—The identification of *K. weyersi*, Heyl., with *Perina*

bipars, Wlk., by Heylaerts himself (*cf.* Proc. S. E. Belg. 1886, Oct.) was incorrect.

Larvæ and cases of Coleophoridae in Silesia. C. Schmidt, Soc. Entom. iv. pp. 169, 184, v. pp. 3, 12, 19, 44.

New species:—(a). Three new species of Psychidæ from British India. F. J. M. Heylaerts, *l. c.* p. xi. *Chalia elwesi*, Heyl., Ganjam; *Kophene moorei*, Heyl., Bangalore; *Bijugis sikkimensis*, Heyl., Ooty.—(b). A new species of Psychid from Assam. F. J. M. Heylaerts, *l. c.* p. xii. *Kophene snelleni*, Heyl.—(c). Four new species of Glaucopidæ from Brazil. Heylaerts, *l. c.* p. xiii. *Lamocharis 5-punctata*, Heyl.; *L. nigripes*, Heyl.; *Hæmaterion dycladioides*, Heyl.; *Charidia similis*, Heyl.—(d). Three new species of Heterocera from the Dutch E. Indies. Heylaerts, *l. c.* p. xvi. *Syntomis claremontii*, Heyl.; *Nyctemera sumatrensis*, Heyl.; *N. tritoides*, Heyl.—(e). Six new species of Heterocera from the Dutch E. Indies. Heylaerts, *l. c.* p. xxvi. *Squamura* (n. gen.) *maculata*, Heyl., Sumatra; *Miresa sanguineo-maculata*, Heyl., Sumatra; *M. nigriplaga*, Heyl., Sumatra; *Thosea lutea*, Heyl., Java, Sumatra; *Arctia brunnea*, Heyl., Sumatra; *Gonitis virida*, Heyl., Java.

ORTHOPTERA.

On the species of Tettigidæ collected in West Africa by Herr Büttner. Dr. F. Karsch, Ent. Nach. 1890, p. 17. Five new species are described, with three new genera:—*Xerophyllum galeatum*, *Acrophyllum undulatum*, *Trypophyllum glabrifrons*, *Hippodes vicarius*, *Coptotettix annulipes*. Of two old species the synonymy is corrected as follows:—(1). *Phloeonotus jugatus* (*Tettix jugata*, Wlk., Cat. Derm. Salt. B. M. iv. 1870, p. 819; *Hymenotes humilis*, Gerst., Zarg. 1873, p. 47, pl. 3, fig. 7; *Phloeonotus humilis*, Boliv. Ann. S. E. Belg. 1887, p. 304, pl. 5, fig. 27; *P. natalensis*, Boliv., id.)—(2). *Pantelia horrenda* (*Cladonotus horrendus*, Wlk.; *Pantelia cristulata*, Boliv.).

On Phaneropteridæ. Dr. F. Karsch, Ent. Nach. 1890, p. 57. (1). Two new species belonging to two new genera:—*Ceratopompa festiva*, *Tetraconcha fenestrata*.—(2). *Stilpnothorax loricatus*, Pictet, = *Potamonota dregii*, Burm.

Monograph of the Proscopidæ. Dr. C. Brunner v. Wattenwyl, Verh. Z. B. Ver. Wien. 1890, p. 87, pl. 3, 4, 5.

RHYNCOta: HEMIPTERA-HETEROPTERA.

On the Ethiopian Rhyncota in the Brussels Museum. W. L. Distant, Pr. Soc. E. Belg. 1890, p. li.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

CUCULLIA ABSYNTHII IN WALES. — In reference to Col. Partridge's suggestion as to the above (Entom. 291), I may say I found the food-plant growing commonly near Arthog; indeed, I noticed some in a hedge close to the spot where I found my insect. I have very little doubt that by watching the flowers of the honeysuckle a little before dusk the species might be taken in fair numbers in the locality.—NEVILLE CHAMBERLAIN; Highbury, Moor Green, Birmingham.

ENNYCHIA OCTOMACULATA IN NORTH WALES.—On June 20th I took several specimens of *Ennychia octomaculata* near Llanrwst. Mr. Wood says, in 'Insects at Home,' that this does not appear to be common in any part of England, but that he took four or five from one locality, Bagley Wood. I took two or three near Llanberis, but near Llanrwst I could have caught dozens without much trouble, as they appeared to be quite common in one locality.—DOUGLAS H. PEARSON; The College, Chilwell, Notts.

AMPHIDASYS BETULARIA VAR. DOUBLEDATARIA IN NOTTINGHAMSHIRE.—I have taken this year two of the black variety of *Amphidasys betularia*, which occurs in this neighbourhood, but which I believe to be rare in the south.—DOUGLAS H. PEARSON; The College, Chilwell, Notts.

LARVÆ OF BOMBYX NEUSTRIA ABUNDANT AT STOKES BAY.—The larvæ of *Bombyx neustria* were very abundant in this neighbourhood this spring. In one hedge at Stokes Bay I counted no less than nine nests of these larvæ; and, as Southampton is not a dozen miles from here as the crow flies, it is probably the larva of this species which is referred to in Entom. xxiii. 260.—W. T. PEARCE; 101, Mayfield Road, Seafield, Gosport.

DELLEPHILA EUPHORBIE.—I am now able to give the result of the very fortunate find of my friend, which is recorded in Entom. xxiii. p. 18. Of the ten pupæ entrusted to my care, and which I subjected to the temperature of a room which had a fire daily through the winter and spring, the first emergence was that of a male on May 5th. The order of the other emergences is as follows:—May 9th, male; May 13th, male; May 31st, female; June 6th, male; June 16th, male; June 22nd, female; July 24th, female. They are all very fine and beautiful specimens. One pupa died, and one is still alive (evidently a female) which seems to be going through a second winter in this stage. I was able to pay a short visit the third week in July to the spot where the larvæ were found last autumn, but though I searched every piece of *Euphorbia paralias* most thoroughly, I failed to discover any trace whatever of larvæ, young or middle-aged.—(Rev.) J. SEYMOUR ST. JOHN; 42, Castlewood Road, Stamford Hill, N., Sept. 9.

MAMESTRA PERSICARIE.—I am now feeding up a number of these larvæ on ivy, upon which I found them; they eat it freely. Is not this an unusual food-plant? I have never seen it recorded in any book.—(Rev.) J. SEYMOUR ST. JOHN; 42, Castlewood Road, Stamford Hill, N., Sept. 9.

[Larvæ of *M. persicaria* have been noticed this year feeding on ivy, poplar, lilac, plum, clematis, and raspberry; the bulk of them were some shade of brown.—ED.]

LARVÆ OF ARCTIA CAIA FEEDING ON IRIS PSEUDACORUS (YELLOW IRIS).—On June 15th I found some larvæ of *A. caia* feeding on the flowers of *I. pseudacorus*. This species is said to feed on various low-growing plants, but I cannot find the above-mentioned as one.—J. E. KNIGHTS; 14, Beaconsfield Road, North Denes, Great Yarmouth.

ACRONYCTA STRIGOSA.—I have to record the capture of a specimen of *Acronycta strigosa*, which I took at sugar near the village of Upware, in Cambridgeshire, on the 12th of July last. The insect is in fairly good condition.—HENRY A. HILL; 132, Haverstock Hill, Hampstead, N.W., Sept. 15, 1890.

HESPERIA LINEOLA.—In the report of Proceedings of the South London Natural History and Entomological Society (Entom. 296), "Mr. Tugwell expressed an opinion that this species occurred on the salt-marshes, and that those taken on the hills had been blown there." This is only a bare idea without proof. What I did say was, that I had made two excursions to Leigh for *Hesperia lineola*. My first captures there I had carefully examined, and found all to be *lineola*; and then, working on to Hadleigh, I had boxed all the *Hesperia*, thinking them to be *lineola*, but on reaching home I found 75 per cent were *thaumas*. On my second visit I commenced collecting at the same spot, and found nearly all my captures on the lower ground were *lineola*. I then met Mr. Turner, and he had been nearer the marsh than myself; he had secured some thirty specimens of *lineola*; together we worked over the ground to Hadleigh, and found *thaumas* much more common than *lineola*. We then struck out into the marshes below; there we secured a long series of *lineola*, but not a single *thaumas* amongst them. This indicates pretty clearly that its habitat was the marshes, and not the higher ground.—W. H. TUGWELL.

SIREX GIGAS IN DEVON.—On the 5th inst. I captured a specimen of the above insect, making the third I have taken here. They seem to vary considerably in size. No. 1, length to point, $1\frac{1}{2}$ in.; expanse of wings, $2\frac{1}{2}$ in. No. 2, length to point, $1\frac{1}{2}$ in.; expanse of wings, $2\frac{1}{2}$ in. No. 3, length to point, 1 in.; expanse of wings, $1\frac{1}{2}$ in. — JOHN N. STILL; Langstone, Horrabridge.

MACRO-LEPIDOPTERA IN THE NEW FOREST.—Your correspondent. Mr. E. G. Alderson, has given such a melancholy account of the Lepidoptera to be met with in the New Forest this season (Entom. 258), that I should like to record my experiences of the collecting there. I took up my quarters at Brockenhurst on the 28th of June, and stayed there until the 17th of July. The weather was not at all propitious for collecting, being stormy, with very few bright sunny days. The following were the most noteworthy Macro-Lepidoptera that I met with:—*Gonepteryx rhamni*, hibernated specimens; *Argynnis selene*, fairly numerous; *A. aglaia*, abundant in one locality; *A. adippe*, scarce; *A. paphia*, males abundant before July 17th, but females scarce even then, consequently the variety *valesina* was very rare; *Limenitis sibylla*, fairly numerous in certain localities, but very much damaged by the stormy weather,—it was very seldom one could net a perfect specimen; *Pararge egeria*, very abundant; *Satyrus semele*, a few specimens seen on July 16th; *Epinephele ianira*, very abundant, a few "bleached" forms taken; *E. hyperanthes*, abundant; *Lycana agon*, very abundant on certain heaths; *Syrichthus malva*, a few specimens noticed, but these were somewhat *passé*; *Hesperia thaumas*, abundant in certain places by about July 13th; *H. sylvanus*, very abundant; *Zygana meliloti*, I saw several specimens, taken by the local collectors; *Z. trifolii* and *Z. filipendula*, both plentiful; *Calligenia miniata*, not uncommon; *Lithosia mesomella*, a few specimens taken; *Gnophria rubricollis*, I saw specimens recently taken, but did not meet with this species myself; *Emydia cribrum*, taken in large numbers by the local collectors this season; *Euchelia jacobææ*, both imagines and larvæ common; *Nemeophila russula*, common; *Arctia caia*, common; *Heptalus hectus*, common; *Bombyx quercus*, larvæ taken on heath; *Thyatira batis*, fairly common; *Moma orion*, I saw one specimen which had been taken at rest by a brother collector; *Acronycta psi*, very abundant; *Leu-*

cania turca, a few taken at sugar; *L. impudens*, a few taken on the bogs; *L. impura*, very abundant; *Xylophasia lithoxylea*, *X. hepatica*, *Dipterygia scabriuscula*, *Miana strigilis*, *M. fasciuncula*, *Grammesia trigrammica*, all at sugar, sparingly; *Acosmetia caliginosa*, taken by a local collector; *Rusina tenebrosa*, at sugar; *Agrotis strigula* (= *porphyrea*), common on the heaths; *Noctua plecta*, *N. festiva*, at sugar; *Panolis piniperda*, one larva taken, which proved to be "ichneumonised"; *Phlogophora meticulosa*, at sugar; *Aplecta nebulosa*, abundant; *Hadena dentina*, *H. thalassima*, at sugar; *H. genista*, one, at light; *Anarta myrtili*, taken on the heaths,—several larvae also taken, which subsequently proved to be ichneumonised; *Phytometra viridaria*, not uncommon; *Urapteryx sambucaria*, *Metrocampa margaritaria*, both common; *Boarmia repandata*, very abundant, some nice forms taken, including the variety *conversaria*; *B. roboraria*, not uncommon; *Pseudoterpna pruinata*, (= *cytisaria*), not uncommon; *Phorodesma pustulata* (= *bajularia*), one specimen taken; *Acidalia immutata*, common locally; *A. emutaria*, abundant on the bogs; *Macaria liturata*, *Bupalus piniaria*, amongst the firs; *Aspilates strigillaria*, locally common on the heaths; *Hypsipetes sordidata* (= *elutata*), common; *Eubolia limitata* (= *mensuraria*), *E. plumbaria*, both abundant; *Tanagra atrata* (= *cherophyllata*), common; *Pyrausta purpuralis*, abundant; *Herbula cespitalis*, common; *Endotricha flammealis*, locally common. Certainly entomologising in the New Forest this season was disappointing work, especially at night, when "sugar" would attract but few insects; but I think the above list of species met with shows that the Forest was not, entomologically, such a desert as Mr. E. G. Alderson's letter would lead one to suppose it to have been. I may mention that I found insects at the Forest to be fully a week later than at Abbot's Wood, in Sussex, where I had just been collecting, and also considerably later than I had found them at the Forest in previous seasons.—E. W. H. BLAGG; Cheadle, Staffordshire.

A WEEK AT SHERWOOD FOREST.—On August 18th of this year, accompanied by my friend Mr. James Batty, of this town, I arrived at Edwinstowe, a small village situated close upon the Forest, and found most comfortable accommodation at 'The Royal Oak' Inn, which I can safely recommend to any entomologist visiting the locality. Every evening during our stay, with the exception of Sunday, we tried the seductive allurements of old Scotch black treacle, beer, and rum, but, except on one occasion, with very poor results. The one exception referred to was on Monday, August 25th. Directly we had put the treacle on the trees the rain commenced to pour down, and did not cease the whole night. As soon as rain began to fall my friend Batty wished to go back, as he said insects never came out in the rain; at least he had not known them to do so in forty years' experience. However, I persuaded him to accompany me just for one round, and, greatly to our surprise, we found the trees literally swarming with moths. Well, in that one round I filled about 120 boxes, all with good insects; and I think any enthusiastic entomologist would not have minded the thorough soaking that we got if the same good fortune attended. By far the commonest insect at sugar that night was *Noctua dahlii*, which swarmed on every tree. *Euperia fulvago* is a dead failure this year in its head-quarters, and I do not think we took eighteen specimens all the time we were there. Another curious thing was that we did not see even one specimen of *Amphipyra pyramidea*, which is usually an abundant species in the Forest. A few *Noctua glareosa*, in excellent

condition, were taken. One of the most amusing episodes of the wet night was that nearly all the insects on the trees were wet through, as far as their scales would allow them to be, and yet seemed quite to enjoy the bath, which was certainly more than we did; one *Triphena fimbria* in particular, I remember, was situated just under a leaf from which the rain was dropping every second, but this seemed to be a source of pleasure to the insect rather than otherwise. Ragwort flowers also had a large share of attention. All the villagers thereabouts say that never in their memories has there been more bloom than this year; in fact it was almost too abundant. Amongst the larger patches we had no success, but the more solitary plants bordering the roads repaid us the best. Our first night was the most successful at this mode of capture, though we tried it every night, as well as the treacle, about fifty *N. dahlii*, twenty-five *Agrotis tritici*, and one *Hydracia nictitans* (the only one seen during the visit) being the result of an hour and a half's work on this particular evening. Heather-bloom produced literally nothing either by day or night, though carefully worked; one *E. fulvago* was taken at rest at night upon it, and *Cidaria testata* was rather common flying around the bloom at dusk. One *Luperina cespitis*, one *Charaas graminis*, and a clearwing (taken by Mr. Batty, the species of which we are not quite certain about yet), all taken at ragwort in the day-time, completes a meagre list of imagines. Of course the redeeming feature was the abundance and splendid condition of *N. dahlii*, but then everything else was very scarce, except *A. tritici*. Larvæ were also a most utter failure, beating birch and oak hour after hour and day after day producing absolutely nothing; *Ephyra punctaria* and *E. pendularia*, of which one can generally get fifty of each in one day during a good season, I only took three of the former and two of the latter. *T. punctulata* was represented by about half-a-dozen larvæ. The day before we left some small, large-headed, Tortrix-like larvæ, beaten from birch, puzzled us considerably at first, but we have since found them out to be *Cymatophora duplaris*, and wished we had taken more. Ragwort produced larvæ of *Eupithecia absinthiata* and *E. centaureata* fairly commonly, but required a good deal of finding, as there was so much food to look over; the latter species was considerably the commoner. Altogether the year has been a very poor one for most insects, though some have been more than usually abundant; but it has been the larvæ more particularly that have been so conspicuous by their absence. In Mr. Batty's long and my own short entomological career we have never known such an utter absence of even the commonest of autumnal larvæ, or when beating and searching alike have been so unproductive.—A. E. HALL; Norbury, Sheffield, September 3, 1890. [If any entomologist has found larvæ in their usual numbers during the past August and September, perhaps he will be good enough to communicate a note on the subject.—ED.]

NOTES ON SUGAR.—The reports of captures at sugar during the past year or two have been so conflicting, and on the whole so discouraging, that any little information on the subject may be worth recording, and therefore the account of three evenings at sugar in this immediate neighbourhood, may not be altogether devoid of interest, especially as they appear to agree most completely with news received from other localities. On each occasion I sugared some twenty trees growing in a lane not half a mile beyond the continuous lines of bricks and mortar, of which this neighbourhood is chiefly composed, and where the hedgerows largely

consist of bramble and nettle. On July 12th the night was cool, air clear, sky overcast, and wind S.W., fresh breeze. Hardly had I got the sugar on the trees when the moths began to come to it, and continued to do so freely as each succeeding round was made. Between the trees were large patches of bramble in full blossom, but I failed to find any *Noctuæ* at them, nor was I any more fortunate at the nettles; but these were perhaps hardly sufficiently far advanced to be likely to prove attractive. July 19th, night chilly, air clear, sky cloudless, wind N.E., light breezes. Moths were decidedly common at the sugar, and continued to arrive until, having filled all my boxes, I left. Bramble was still in full bloom, and nettles fairly well out; but although both plants were carefully searched, no *Noctuæ* were taken at them. August 6th, the day had been hot and the evening at starting was very warm and calm, a slight haze hung in the valleys and the sky was clear. While applying the sugar, an ominous chattering of the aspens foretold a coming breeze, which ultimately proved to be from the E. Not one moth visited the sugar. Nettles were now in full bloom, but produced nothing in the way of *Noctuæ*, nor were any seen on the wing; the only representative of that group observed being *Triphana pronuba*, a solitary example in most dilapidated condition, feasting on a somewhat over-blown cluster of bramble. Reports have reached me from time to time during the summer from various localities, extending over the greater part of the kingdom, and they all agree that up to the middle of July sugar was most attractive and then suddenly became absolutely useless, and my own experience in other parts of the London district are quite in accord. Ragwort, thistles, rush, and sundry other flowers, appear to have produced some few *Noctuæ*, but the general report is that the numbers are but small,—too small indeed to explain their complete absence from the sugar; nor do the meteorological conditions appear to offer a satisfactory solution of the problem, for if the east wind and clear sky were the cause of the dearth of moths on the 6th of August, we might reasonably have expected them to exert a like influence on the 19th July. —ROBT. ADKIN; Lewisham, Aug., 1890.

NOTES ON THE SEASON. — When I first took up the study of our Tortrices and Tineæ I am afraid that I handled the latter very roughly; this I ought not to have done with youth and good sight on my side. Now not being quite so young, my main hobby is the *Nepticulæ*, and of these I have this year set more and better than ever, both as regards pinning and setting. Now to begin an account of my doings. All my pots were left outside until April this time. I wanted to break the back of breeding before active service began, so I brought the said pots into my breeding-room, that was kept at a moderate temperature. The first insect to appear was *N. sorbiella*, from mountain ash; next came *N. hodgkinsonii*, from wild rose, ten specimens; then *Trifurcula pulverosella*, from wild apple; *N. floslactella*, from nut; *N. aucupariæ*, from mountain ash; *N. ignobilella*, from hawthorn; *N. lapponica*, from birch; *N. splendidissimella* from raspberry; *N. gei*, from dewberry; *N. malella*, from wild apple, from the highland district; this I had not met with before and mistook them for *N. desperatella*. After spending days and walking miles looking over all the old crab-trees for what I supposed to be *desperatella* (but I did not neglect the few well-known local trees), I found *desperatella*. I thought what an observer Dr. T. H. Wood was when he found larvæ of this local

species! Well, the result is that I have bred about forty specimens. They are as easy to breed as *N. tilia*, which also put in appearance in fair numbers. *B. hippocastanella*, from lime; a few *N. ruficapitella*, from oak; *N. salicis*, from the silver-leaved osier, the larva feeding nearly at the tip, quite a different way to the usual well-known *salicis* mine. Mr. Threlfall did not recognise the mine, more about this next October; one odd *N. poterii* only out of five larvæ; *N. argentipedeella* and *N. betulicola*, from birch; a series of *N. plagicolella*, from sloe; only two *N. angulifasciella*; I find this bad to breed; out of twelve *N. serella* I bred about ten; they were the latest of all, if I may except *N. luteella*. Now, here is a puzzle:—In October I got some mines close to home, expecting them to be some new species. I sent mines for Dr. Wood's opinion, and he referred them to *N. lapponica*; well, I sent him the moths, having bred over a score, and said all had come out *N. luteella*. He suggested I had made a mistake, or that they were in a pot where the pupæ of *luteella* had lain over. I am pretty sure I had not, because I only put the queer *salicis* and the mines referred to in a pot separate from anything else and labelled the pot carefully. Now we will leave *Nepticulæ* and proceed to odds and ends. Only two *Coccyx scopariana* came out; I did not want any, so spent no time after the larva last July. *Penthina postrema* came out until the end of May very large and fine; a good series of this from the stems of the balsam (*C. noli-me-tangere*). By the way, I have omitted to say I bred about fifty fine specimens of *Coccyx vacciniana*, from bilberry. I met with a small patch with the leaves all stripped off; the larvæ had rolled themselves round the stem with the dead leaves. The second week in May I went two rather long journeys for *Micropteryx salopiella*, and only got four and some *M. sparmannella*. Third week in May, a very unfavourable day, a glimpse of sun now and again with a high wind, I got a dozen fine *Catoptria aspidiscana* among the golden-rod; a few of the lovely *P. lewenhoekella* were walking about on the barest place where the *Helianthemum* grows. On the sunny side, sheltered from the strong wind, I boxed about eighty mixed *Nepticula woolhopiella* and *N. argentipedeella*. The tips of the birch produced several species. On a little shady bank of *Vaccinium C. vacciniana* were flying in plenty. With two nets all boxes were soon filled. My son said, "This is moth-catching made easy." He sat down, smoking his weed—"and here is another; hand me the other net." Do not think this would be so at any time,—no sun, no moths; they drop instantly, whenever the sun is obscured. By the way, when I looked in a pot in which I had put a lot of seeds from angelica, expecting that probably *T. mediana* (= *aurana*) might turn up, to my surprise there were nine *E. lucipara* out; I did not notice any larva. Now *Ecophora flavimaculella* is appearing; *Ornix anglicella* and two *Lithocolletis cavella* have turned up at my own door. On Whit Saturday I took advantage of a cheap trip to Windermere. Until the season sets in it is too dear—8s. 2d. for return 52 miles. I have not had such a chance for years. The woods were nearly dried up. I was surprised to see such a lot of moths stirring. Geometers pretty common, in fact *C. corylata*, *M. albicillata*, and even *Eupithecia plumbeolata* was out among the *Melampyrum arvensis*; I undertook to take this in July. There were very few *Lithocolletis*. An odd gr. silver-lines (*H. prasinana*) swept into my net from time to time. The places where I used to take *M. mansuetella* have yielded none for years. got entangled in a rough thicket, and made for a light place about

yards square, where I swept a *mansuetella*; I looked round and, as usual, there the meadow-sweet grew. I cleared away some brambles for net room, and got about fifty specimens, the finest I ever saw, I put the boxes in a tin box, among the cold leaves, and got them home in fine condition. I went again on the Monday, and had the greatest trouble in finding the place. To be out of the way of painters and other workmen in the house, I went to Windermere for a month, but unfortunately left behind one of my pots containing pupæ of *Cidaria reticulata*. When I came home I found that the flower of my hopes was wrecked, for what are called "church-lice" and "wire-worms" had left nothing but a lot of wings. I was disgusted to count the remains of twenty-two specimens of the *Cidaria*. My other pot has produced ten fine large *reticulata*; one a remarkably fine variety, one-half of the fore wings (the outer half), being of a smoky amber colour; two others are partly in that direction. I must have a look over my captures, and will note them in the next article.—J. B. HODGKINSON; Ashton-on-Ribble, July 12, 1890.

A HINT TO PUPÆ-DIGGERS. — Now that the season for imagos is waning, collectors will be going forth with their trowels, and turning up the sod in search of pupæ. This turning up the sod is by no means always an easy matter, especially at such trees which are not regularly dug. To reduce this labour of digging to a minimum, let the digger provide himself with an ordinary garden trowel, and in addition to this he must procure a file; let it be round on one side, flat on the other, and finely cut. By keeping his trowel sharpened with this he will find digging done with comparative ease, less pupæ will be destroyed, and a far greater amount of work accomplished. The time taken in going from tree to tree should be utilised for the sharpening process. I strongly recommend those who have as yet neglected the use of a file, to start it at once.—J. CLARKE; 26, Carey Street, Reading, Sept. 17, 1890.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—September 3rd, 1890. Mr. Henry T. Stainton, F.R.S., in the chair. Mr. C. Fenn exhibited and remarked on specimens of *Eupithecia satyrata*, *Eudorea ambigua*, and *Tortrix viburnana* from Darlington. Mr. H. Goss exhibited, on behalf of Mr. Martin Stanger Higgs, a remarkable variety of *Melitæa aurinia* (*artemis*), taken a few years ago, in Gloucestershire, by Mr. Joseph Merrin. The Rev. Dr. Walker communicated some observations on the Entomology of Iceland, and gave an account of his recent travels in that island. He stated that he had taken *Bombus terrestris* this year, for the first time, in the north-west of Iceland, from which quarter of the island it had not been recorded by Dr. Staudinger; he also referred to the enormous numbers of Ichneumonidæ and Diptera which he had noticed in the island. He further stated that in 1889, in the months of June and July, *Noctua confusa* was the most abundant species of Lepidoptera in Iceland; but that this year, in July and August, *Crymodes exilis* was the prevailing species, and that *Charæa graminis* and *Coremia munitata* also occurred in great numbers. In reply to a question by Mr. Stainton, Dr. Walker said that the flowers

chiefly frequented by the humble-bees were those of a small species of white galium (probably *Galium saxatile*?) and *Viola tricolor*. Dr. Walker also read "Notes on *Calathus melanocephalus* collected in Iceland, the Westmannö Isles, and the Faroe Isles in June and July, 1890." Messrs. M'Lachlan, Stainton, Jenner Weir, Stevens, Jacoby, Lewis, and others took part in the discussion which ensued. Mr. Arthur G. Butler communicated a paper entitled "Further Notes on the Synonymy of the genera of Noctuides."—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —August 28th, 1890. J. T. Carrington, F.L.S., President, in the chair. Mr. C. Fenn exhibited an example of *Polyommatus phleas*, L., having the left lower wing small and pale; *Odontia dentalis*, Schiff., from amongst *Echium vulgare*; *Crambus contaminellus*, Hb.; *Grapholita cæcana*, Schl.; and *Sphaleroptera ictericana*, Haw.—all from Deal; *Pedisa solandriana*, L., from Bexley; *Carpocapsa grossana*, Haw., from Mickleham; *C. pomonella*, L., from Lee; also a large number of *Cidaria truncata*, Hufn., bred from ova obtained from a captured female, which was exhibited. Mr. South pointed out that the parent moth was a variety, and that half the brood varied from the type in the same way. Mr. Carpenter exhibited *Pericallia syringaria*, L., bred from larvæ taken in Essex; and *Cucullia asteris*, Schiff., from Folkestone. Mr. South, local forms of Lepidoptera from the Durham district. Mr. Turner, *Myelophila cribrum*, Schiff., from Leigh, Essex. Mr. R. Adkin, *Zygæna meliloti*, Esp., from the New Forest, and remarked upon the disappearance of this species from the particular locality where it was originally taken, and its discovery in another part of the Forest. Mr. Waller, living larvæ of *Acronycta leporina*, L.; and an example of *Smerinthus ocellatus*, L., which had emerged from the pupa with one antenna. Mr. Robinson, *Nonagria brevilinea*, Fenn. Mr. Joy, *Plusia festuæ*, L., larva and pupa, and remarked that this species was apparently double-brooded, as he had taken it in the latter part of August. Mr. Tutt expressed an opinion that the species was consecutively brooded in June, July, and August. Mr. Hawes, young larvæ of *Apatura iris*, L., and stated that the larva had no horns before the third skin; also *Tapinostola extrema*, Hb., from Huntingdonshire, caught in July of this year. Mr. Frohawk, a variety of *Epinephele hyperanthes*, L., with the markings lanceolate, from the New Forest. Mr. Weir mentioned that he had two of the same variety, also from the New Forest. Mr. Carrington observed that, after examining hundreds of the species in the same locality, he had only been able to find the var. *arete*, Müll. Coleoptera were exhibited by Mr. Perks, and botanical specimens were shown by Messrs. J. Jenner Weir and E. Step. Mr. Carrington made some observations on collecting Rhopalocera in the Ostend district, and a discussion arose as to the abundance or scarcity of Lepidoptera this season, in the course of which it was stated that *Lycæna corydon* had been generally scarce, and that, with a few exceptions, the season had been a bad one for Lepidoptera.

September 11th.—J. Jenner Weir, F.L.S., Vice-President, in the chair. Mr. Robertson exhibited a living larva of *Acherontia atropos*, L., from near Bognor. Mr. Oldham, a very light specimen of *Polyommatus phleas*, L.; a dark form of *Argynnis euphrosyne*, L.; also examples of many other species, including *Hesperia lineola*, Ochs., from the fens of Huntingdon. Mr. Croker, *Ditula hartmanniana*, Clerck., from the banks of the River Lea. Mr. Fenn remarked that the species occurred all round London

on the trunks of willow trees. Mr. Wellmann, *Bryophila muralis*, Forst.; *Dianthæcia albimacula*, Bork.; *Plusia festuæ*, bred from pupæ received from Cambridge; also living larvæ of *Acronycta euphorbiæ*, Fb. Mr. J. A. Cooper, dark specimens of *Bryophila perla*, Fb., from Folkestone. Mr. Carpenter, a specimen of *Argynnis paphia*, L., with the right under-wing almost colourless; a variety of *Argynnis aglaia*, L., with the spots on the under-side blending together; also a series of *Epinephele hyperanthes*, L., showing considerable variation. Mr. R. Adkin, bred specimens of *Emmelsia decolorata*, Hb., from Ireland, larger and more defined in colour than those usually taken. Mr. T. D. A. Cockerell, *Vanessa antiopa*, L., from Wet Mountain Valley, Colorado, and called attention to the irroration of the borders with black, a feature specially noticeable in American specimens of the species; also three species of *Cetonia* from Syria, viz., *Cetonia opaca*, Fb., *C. floricola* var. *ignicollis* (Dej.), Gory and Peach, and *C. impavida*, Janson. With reference to the last-named species, Mr. Cockerell stated that the specimens appeared to be specifically identical with this Indian species, as they appeared to agree in all essential points with an example in the British Museum, from Aden, named by Mr. Janson. The distribution of the species, therefore, appeared to be India, Aden, and Syria. Mr. Cockerell also exhibited two examples of *Trichodes* from Syria, one of which he stated apparently agreed with *T. syriacus*, Dej., as described in Spinola's Monograph, but was considerably larger; the other seemed to be a variety of *T. favarius*, Ill. Mr. Oldham exhibited a specimen of *Sirex gigas*, taken in the High Road at Woodford. Mr. T. R. Billups asked whether the large number of *Vespa vulgaris* had been noticed by members; when sweeping at Shirley Heath for Hymenoptera he had obtained from eight to a dozen at every sweep of the net. Mr. Rice remarked that near Ockley, within an area of 200 yards, he had counted thirty nests. Mr. South said that in 1879, which was a similar year to the present one, wasps were plentiful.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—August 18th, 1890.—Rev. C. F. Thornehill, V.P., in the chair. Mr. Thornehill showed a nearly black male *Argynnis aglaia* from Cannock Chase; also a specimen of *Arctia caia*, of a curious brick-red colour; also *Stilbia anomala* from Cannock Chase. Mr. E. C. Tye showed a number of Noctuæ bred from larvæ found feeding on low plants by night, at Hopwas Wood and Marston Green. Mr. R. C. Bradley showed *Brephos notha* bred from a female taken at Trench Woods; he also showed *Chrysoclysta bimaculella* from Wyre Forest. Mr. H. M. Lee showed a number of Lepidoptera from Sutton Coldfield. Mr. G. H. Kenrick read a paper on "Collecting in North Wales," in which he referred to the comparatively small number of species found there, considering the diversified character of the country and climate. He thought it might be accounted for by the great rainfall. Mr. Neville Chamberlain made a number of remarks on the Macro-Lepidoptera found by himself and Mr. Kenrick, while staying at Barmouth, from July 4th to 9th, this year. They had taken 108 species, including *Cucullia absinthii*, *Acidalia contiguaria*, &c. Mr. H. M. Lee mentioned a habit he had noticed in larvæ of *Thyatira batis*, of falling to the ground when a noise is made.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

REVIEW.

A Synonymic Catalogue of Neuroptera Odonata, or Dragonflies; with an Appendix of Fossil Species. By W. F. KIRBY, F.L.S., F.E.S., &c. 8vo, pp. ix. 202. London: Gurney & Jackson, 1, Paternoster Row. Berlin: R. Friedländer & Son. 1890.

IN the present work, Mr. Kirby has endeavoured to facilitate the study of an interesting but little known group of insects by the publication of a complete catalogue of genera and species, uniform with his 'Synonymic Catalogue of Diurnal Lepidoptera.' How much still remains to be accomplished in the Odonata may be seen from the fact that in many families almost all the work already done has been by one man, Baron De Selys-Longchamps. Except in the Libellulinæ, where Mr. Kirby has arranged the genera in accordance with the revision of the subfamily which he recently published in the 'Transactions of the Zoological Society,' he has mainly followed the various synopses and monographs published by the Belgian author, except that he has occasionally revised the nomenclature, and has not adopted the Baron's somewhat cumbrous system of genera and subgenera, deeming it too complicated for the purposes of a simple catalogue.

Mr. Kirby's Preface is devoted chiefly to an exposition of the principles of nomenclature which he has adopted in the present Catalogue, and this portion of the work will probably be read with interest by many entomologists who are not neuropterists, whether they entirely agree with his views or not. The book likewise appeals to the geologist as well as to the entomologist, for the Appendix of Fossil Species occupies twelve closely printed pages, and gives full references to the rather voluminous literature relating to more than a hundred recorded species.

From the point of view of Systematic Entomology, a catalogue is only second in utility to a monograph; and whatever imperfections may afterwards be pointed out in Mr. Kirby's work, we have no doubt that it will prove of great value to all entomologists who are interested in the Odonata.

OBITUARY.

PETER MAASSEN, late of Elberfeld and Düsseldorf, died suddenly on the morning of the 2nd of August last, at Falkenstein in the Black Forest; he was in his eightieth year. Though not a voluminous writer, he was well known among lepidopterists, both by the pleasant reception he invariably gave to those who called to see his fine collection of Exotic Lepidoptera, and by his occasional visits to London and Paris. His specialty was the Saturniidae, in illustration of which family he and his friend, Gustav Weymer, issued a series of plates, under the title of 'Beiträge zur Schmetterlingskunde.' It is understood that his collection has been left to the Museum at Berlin.

Mr. C. G. HALL died on the 3rd of September, at his residence, 14, Granville Street, Buckland, Dover. As an entomologist he seems to have been attracted by each Order in turn, but the Coleoptera and Hymenoptera were his favourite groups. He was well acquainted with the literature of his subject, and his conversation was not only interesting, but showed that he was a shrewd observer of nature. There are various notes and papers from his pen in the later volumes of the 'Entomologist' and 'Entomologist's Monthly Magazine.'

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ADDITIONS TO THE BRITISH LIST OF DELTOIDS, PYRALIDES, AND CRAMBI, SINCE 1859.

By RICHARD SOUTH.

(PLATES III. & IV.)

(Concluded from p. 305.)

EPHESTIA KÜHNIELLA, Zell. (Pl. IV. fig. 2.)

BRIT. REF.:—

Myelois ceratoniæ, Thompson, Entom. xx. p. 66.

Ephestia kühniella, Barrett, Ent. Mo. Mag. xxiii. p. 255 ;

Thompson, l. c. p. 139 ; Tutt, Entom. xx. p. 212 ; Klein,
Proc. Ent. Soc. 1887, p. lii ; Adkin, Proc. S. Lond. Ent.
and Nat. Hist. Soc. 1887, p. 20, pl. i. fig. 15 ; Cockerell,
op. cit. p. 58 ; Ormerod, Rep. Injur. Ins. 1889.

Size of *ficella*, pale grey, much dusted with dark slate-grey. The first line blackish, indented, and, above the inner margin, deeply angulated, as in *Myelois ceratoniæ*. Second line deeply angulated near the costa, and indented below. Between these two lines is a black streak along the apex of the discoidal cell ; but this is not always distinct. In well-marked specimens there is an oblique, dark, central shade, from costa near apex to inner margin. There are some black dots along outer margin, and the fringes are grey. Hind wings shining white, with the venation and outer margin brown.

The foregoing description is abridged from that given by Mr. Barrett.

Larva whitish or sometimes pinkish, slightly hairy ; head reddish brown ; plates on second and anal segments yellow. Feeding in webs or silken tunnels, on flour and rice-cones.

Introduced by Mr. C. G. Barrett, April, 1887.

Note.—This species appears to have been unknown to entomologists until 1877, when Prof. Zeller received some larvæ and specimens of the perfect insect from Dr. Kühn, of Halle. Ten years afterwards, that is in 1887, *E. kühniella* was bred in this

country by Mr. Thompson, of Stoney Stratford, who found larvæ in a sack of rice-cones. These specimens were supposed to be *Myelois ceratonia*, and were so recorded; but some of them were sent to Mr. C. G. Barrett, who at once identified them as *kühniella*. Most of the European writers have insisted on this flour-pest being an American importation; but American entomologists deny this, and say that, although the insect may have been known in America previous to the year 1889, it was not until that year that it appeared there in any numbers. Prof. Riley, in 'Insect Life' (vol. ii., No. 6), gives a most interesting digest of the European literature on the subject, together with an account of all that was known of the species in America at the time of writing. An exhaustive life-history is given by Mr. James Fletcher in the 'Report of the Entom. Soc. of Ontario, 1889.'

EUZOPHERA OBLITELLA, Zell. (Pl. III. fig. 2.)

BRIT. REF.:—

Euzophera oblitella, Blackburn, Entom. xii. p. 16; Blackburn and Stainton, Ent. Mo. Mag. xv. p. 187; Ragonot, E. M. M. xxii. p. 31; Warren, E. M. M. xxiii. p. 233; South, Syn. List, p. 40.

"Front wings greyish, dusted with darker, both lines black, the first preceded, the second followed, by a pale band; nearly midway between the two is a conspicuous black spot. Hind wings pearly grey, gradually darkening to the hind margin."—(Blackburn.)

The above description does not quite agree with the continental example of *E. oblitella*, now figured.

Introduced by Mr. Blackburn, January, 1879.

BRITISH LOCALITY.—Isle of Wight (S. W. coast).

DISTRIBUTION.—S. W. Germany; Hungary; S. Russia; S. France; Andalusia; Sicily; Asia; N. America.

Note.—The first recorded capture of this species in Britain is that of Mr. Blackburn, who took a specimen in the autumn of 1876, on the south-west coast of the Isle of Wight. Mr. Warren, writing in 1887, says that he obtained an example of *E. oblitella*, between Yarmouth and Freshwater, "some thirteen or fourteen years since," i. e., in 1873 or 1874. M. Ragonot observes that this species has been described by Walker as *Nephopteryx propriella*, and by Clemens as *N. undulatella*. He adds that *E. oblitella* is a very variable insect, and that the larva appears to be unknown.

EPHESTIA ROXBURGHII.

BRIT. REF.:—

Ephestia roxburghii, Gregson, Entom. vi. p. 318; Ragonot, Ent. Mo. Mag. xxii. p. 25.

Expanse, 7—9 lines. "Fore wings broad, costa rounded, colour pale brownish grey, median space entirely suffused with blackish brown, in which the discal spots are hardly perceptible.

First line oblique, greyish, hardly paler than the ground colour. Second line slender, pale grey, parallel to the hind margin, slightly sinuous, followed on the costa by a dark streak. Cilia pale brownish grey, preceded by an indistinct dark line. Hind wings brownish grey, cilia paler. Head, thorax, and palpi brownish grey; antennæ pale brown, not annulated. Palpi recurved, ascending."—(Ragonot.)

Introduced by Mr. C. S. Gregson, February, 1873.

BRITISH LOCALITY.—? Liverpool.

Note.—M. Ragonot considers *E. roxburghii* to be a good species, and says that it has considerable resemblance to *Cryptoblabes bistriga*, but, apart from the different coloration, the neuration is very distinct. He adds, "*roxburghii* has not yet been bred," and this probably means that the larva is unknown, because Mr. Gregson—referring to the specimens shown to him by Mr. Roxburgh, who discovered the species—says, "They fed upon *débris* of old Lepidoptera, &c., in a neglected drawer. How the eggs came there is not known; but it is suspected they were introduced with dried fruits."

PHYCIS ADORNATELLA var. SUBORNATELLA, Dup.

BRIT. REF.:—

Phycis subornatella, Knaggs, Entom. Ann. 1867, p. 141; Barrett, Ent. Mo. Mag. xvi. p. 162, xxvi. p. 20; Richardson, *op. cit.* p. 139.

In this variety the white of the fore wings is paler, a whitish fascia precedes the first line, and the second line is less distinctly angulated.

Note.—All entomologists, whose series of *Phycis adornatella* comprised detachments from various localities, have been greatly perplexed when they attempted to determine some of the specimens comprised in such series. These examples would possess the special characters which would make them appear to be referable to *subornatella*; but, at the same time, their general characters made it apparent that they were not specifically distinct from *adornatella*. To further complicate the matter, examples would also be found which varied from the type of *adornatella* in the direction of *subornatella*, but could not be satisfactorily placed with the latter. Now that those who formerly upheld *subornatella* as a distinct species have withdrawn their support, the insect quietly falls into its proper place as a form of a very variable species, and the British entomologist will henceforth be spared considerable anxiety and much uncertainty attending the "filling up" a series of *subornatella*. It is also satisfactory to find that there is a disposition on the part of entomologists to adopt Hübner's *T. dilutella* (fig. 69) as the type of the species. Thus, after wandering about for twenty-three years, we get back to the name given in the 'Manual.'

NEPHOPTERYX SPLENDIDELLA, Herr.-Sch.

BRIT. REF.:—

Nephoptyx splendidella, Stainton, Buckler, and Wood, Ent. Mo. Mag. xxiv. p. 269.

Nephoptyx sylvestrella, Ragonot, E. M. M. xxii. p. 52.

Dioryctria splendidella, Ragonot, E. M. M. xxiv. p. 224.

Larger than *N. abietella* (= *decuriella*, Hübn.), "with a large patch of reddish brown before the first line."—(Ragonot.)

Introduced by Mr. Stainton, May, 1888.

Note.—This species has probably been in some British collections for many years past, mixed up with *N. abietella*. Mr. Stainton (*l. c.*) publishes extracts from the note-books of the late Mr. Buckler, in which (under the name of *Phycis abietella*) this larva is described, and its curious habits fully set forth. In August, 1874, Mr. Buckler received from Dr. Wood a spruce fir cone, containing a larva of *N. splendidella*, but this did not attain the imago condition. From a large larva, received on September 7th, 1877, Mr. Buckler bred a moth on June 14th, 1878. Between the years 1874 and 1879, Mr. Buckler appears to have had several infested spruce cones sent to him by Dr. Wood, but he observed that only the largest larvæ became moths, and he inclined to the view that the smaller larvæ, received late in the autumn, were not full grown, and required another year to become mature. This, however, they failed to do in confinement.

M. Ragonot says, "The larva is pinkish white, changing to greenish, without any lines; the head is reddish brown, the second segment brown-black, ordinary spots very distinct. It lives in the trunks of old firs, under the bark, causing abundant exudations of resin."

NEPHOPTERYX GENISTELLA, Dup. (Pl. IV. fig. 5.)

BRIT. REF.:—

Phycis davisellus, Newman, Entom. v. p. 445; Moore, *op. cit.* vi. p. 199; Doubleday, *op. cit.* vii. p. 112; List, *Suppl.* p. 2; Moncreaff, Entom. vii. p. 132 (larva); Vaughan, Proc. Ent. Soc. 1873; Blackburn, Ent. Mo. Mag. xiv. p. 159.

Pempelia albariella, Knaggs, Ent. Mo. Mag. viii. p. 163; Entom. Ann. 1872, p. 118.

Phycis (?) *davisellus*, Buckler, E. M. M. x. p. 89 (larva).

Nephoptyx genistella, Doubleday, Entom. viii. p. 41; E. M. M. xi. p. 211; South, Syn. List, p. 21; Leech, Brit. Pyral. p. 104, pl. xii. fig. 8.

Pempelia genistella, Weston, Entom. x. p. 119; Dale, E. M. M. xvi. p. 186.

"Fore wings fuscous greyish, whitish along the inner margin, especially towards the base of the wing; before the first line is a

patch, somewhat circular in shape, composed of a cluster of raised black scales; first line blackish, bordered internally with ochreous brown, angulated, starting obliquely from the junction of the basal and middle thirds of the costa; in the space between the first and second lines are three whitish streaks, the lower two being interrupted in the middle by the ground colour, so as to form four short whitish dashes; the upper extends along the discal cell, becoming slightly dilated at the disc, where a small black dot, composed of raised scales, is conspicuous; above this dot, and about midway between it and the costa, is another minute dot; the second line is blackish, irregularly sinuous, and bordered with ochreous brown towards the apical margin; towards the apex is a whitish patch. Hind wings shining fuscous grey, dusky marginal line double."—(Abridged from description by Dr. Knaggs.)

Introduced by Mr. Newman under the name of *Phycis davisellus*, November, 1871.

BRITISH LOCALITIES.—Isle of Wight; Portsea; Isle of Purbeck.

DISTRIBUTION.—South France; Andalusia.

Note.—Mr. Moncreaff says that the eggs "are laid in July and August on young shoots of *Ulex campestris*, and as soon as the larvæ emerge they spin a thick network of silk round the branch, and under this feed until the approach of winter, when each forms for itself a close cocoon or tunnel of silk in which to hibernate. In early spring the larvæ lengthen these cases, and extend, as they increase in size, the silken web, feeding on the young buds and blossoms beneath it."

CATEREMNA TEREBRELLA, Zinck. (Pl. III. fig. 12.)

BRIT. REF. :—

Cateremna terebrella, Walsingham, Ent. Mo. Mag. xxiii. p. 82.

Epischnia terebrella, Barrett, E. M. M. xxv. p. 399.

Expanse, 8 lines. "Antennæ brownish fuscous. Head and palpi greyish fuscous, the base of the haustellum white. Thorax and fore wings brownish fuscous, interspersed with whitish scales, the most conspicuous marking being an oblique narrow fascia about one-third from the base of the wing, tending outwards to the dorsal margin; this fascia is angulated outwards on the fold and inwards below it. Commencing about the middle of the costa is a conspicuous white patch, which reaches half across the wing, and contains two fuscous spots, the one at its lower edge, the other immediately above it. Below this patch a few white scales are scattered across the wing towards the dorsal margin. Beyond, but separated from it by a brownish fuscous interspace, less wide than that following the first fascia, is a narrow, waved, white, transverse streak, angulated inwards below the costa, the angle pointing to the upper spot in the white patch, angulated outwards slightly above the middle, and again

inwards immediately above the anal angle. Along the apical margin is a row of six or seven brownish fuscous spots, separated by whitish scales. Fringes grey. On the under side of the fore wings a pale costal spot indicates the upper end of the white waved outer line. Hind wings shining grey. Abdomen slightly darker than the hind wings, and tuft pale ochreous."—(Walsingham.)

Introduced by Lord Walsingham, September, 1886.

BRITISH LOCALITIES.—Thetford and Lynn, Norfolk.

DISTRIBUTION.—Germany; Galicia; North-western Russia.

Lord Walsingham, in bringing forward the species (E. M. M. xxiii. p. 84), says that he bred *Cateremna terebrella* in July from cones of *Abies douglasii*, which he had collected during the same month from a tree growing on his estate. A detailed description of the larva is given in the article referred to, from which the following particulars are quoted:—"Semitransparent, greyish white, with some pale brown spots, each bearing a single hair. Head pale brown; plate on second segment slightly paler than the head."

Note.—The specimen figured was kindly lent for the purpose by Lord Walsingham.

PEMPELIA OBDUCTELLA, *Fisch.* (Pl. III. fig. 8.)

BRIT. REF.:—

Pempelia obductella, Button, Entom. v. p. 222; Meek, Ent. Mo. Mag. vii. p. 85; Knaggs, Ent. Ann. 1871, p. 89; Bond, Proc. Ent. Soc., November, 1870; Ragonot, E. M. M. xxii. p. 54; South, Syn. List, p. 40.

Phycis obductella, Doubl. List, Suppl. p. 2.

Allied to species of the *Ornatella* group, "but may be readily recognized by the dark chestnut-brown anterior wings, which are only paler along the costa and on the inner margin, and by the second transverse line, which ceases far below the costa, and is broadly interrupted near the inner margin."—(Knaggs.)

Introduced by Mr. Meek, September, 1870.

BRITISH LOCALITY.—? Norfolk.

DISTRIBUTION.—Central and Southern Europe; South-eastern Russia.

Note.—In bringing forward this species as an addition to the British list, Mr. Meek says, "Several specimens have been captured by Mr. Button, of Gravesend, this season." Dr. Knaggs, referring to these same specimens, says that they were taken by Mr. Button near Gravesend. Mr. Button himself records *Pempelia obductella*, and his note reads, "Norfolk. A few among *Origanum*." According to Mr. Doubleday the larva is dull green, with longitudinal black stripes, and feeds upon various species of mint, especially *Mentha arvensis*.

EPISCHNIA BANKESIELLA. (Pl. IV. fig. 7.)

BRIT. REF.:—

Epischnia bankesiella, Richardson, Ent. Mo. Mag. xxv. p. 63;
Proc. Dorset Nat. Hist. Soc. x. p. 193 (col. fig.); E. M. M.
xxvi. p. 256.

"The expansion of the wings in the female is 1 inch 1 line; in the male it is slightly less. The breadth of the fore wings is almost exactly one-third of the length. The costa in the male is regularly curved; in the female it is much curved at the base and less so near the tip, whilst the intermediate portion is nearly straight. The tip is blunt, and the hind margin convex. The colour of the fore wings is light cinereous grey, clouded with dark grey, especially on the basal half of the wing. There is an inconspicuous narrow light greyish ochreous patch, extending about one-third of the way along the inner margin. The veins are streaked with dark grey. Several dark grey lines cross the wing from the costa to the inner margin; but they are all very indistinct, and only traceable with difficulty, owing to the wings being clouded with the same colour. The most distinct are two lines, one of which starts from the costa near the middle and runs towards the anal angle as far as the centre of the wing, where it turns nearly at right angles towards the base, and when at a short distance from the inner margin turns again at right angles before it reaches it. This line is double at the costa, and the two branches gradually approach each other and meet on the inner margin. The other line is one which runs from the costa near the tip, parallel to the hind margin, to a point near the anal angle, where it turns sharply outwards to the anal angle. There are slight traces of two other lines, one between the two above mentioned and one near the base; but it is difficult to follow their course, owing to the clouding of the wing. A patch of the pale ground colour, less clouded than the rest, extends obliquely from the tip to the inner margin. The fringes are of the pale ground colour, intersected by a dark grey line. The hind wings are very pale brownish grey, with a darker shade close to the margin; the fringes still paler, almost white."

Introduced by Mr. Nelson M. Richardson, August, 1888.

Note.—Mr. and Mrs. Richardson each captured a specimen on the same evening, some time about the middle of July, 1887. They each took a specimen again in 1889; and Mrs. Richardson added one more specimen to her score this year.

The figure (Pl. IV. fig. 7) is from a very beautiful drawing by Mrs. Richardson. If anyone is desirous of seeing a coloured figure of *E. bankesiella*, he should obtain a copy of the 'Proceedings' of the Society referred to above.

RHODOPHÆA CONSOCIELLA var. SODALELLA, Zell.

BRIT. REF.:—

Acrobasis consociella var. *sodalella*, Barrett, Ent. Mo. Mag. xix. p. 111.

Rhodophæa consociella var. *sodalella*, South, Syn. List, p. 21.

Acrobasis sodalella, Ragonot, E. M. M. xxii. p. 26.

Sodalella differs from typical *consociella* in several respects:—"In the larger size, equalling *suavella*; in the more richly crimson-grey central band; and in the form of the first line in the fore wings, which bounds the basal pale patch."—(Barrett.)

Introduced by Mr. C. G. Barrett, October, 1882.

Note.—M. Ragonot is not sure that *sodalella* is a variety of *consociella*. He says there is considerable dissimilarity in the larvæ of the two insects, and adds that "until we can obtain more positive information about *sodalella*, Z., I must consider it distinct from *consociella*, Hb."

RHODOPHÆA RUBROTIBIELLA, Fisch.

BRIT. REF.:—

Acrobasis rubrotibiella, M'Lachlan, Proc. Ent. Soc., Sept., 1858; Stainton, Ent. Ann. 1859, p. 149; Ragonot, E. M. M. xxii. p. 27.

Rhodophæa rubrotibiella, South, Syn. List, p. 21; Leech, Brit. Pyral. p. 108, pl. xii. fig. 16.

Closely allied to *A. tumidella*, but differs from it as follows:—"1. The basal portion of the wing, instead of being orange, is a pale grey, with a red streak along the costa. 2. Instead of the broad orange band beyond the first line, there is only a slender red band. 3. The hind margin of the wing is straighter and less oblique."—(Stainton.)

Introduced by Mr. Robert M'Lachlan, September, 1858.

Note.—Mr. M'Lachlan took two specimens in 1858, flying round an oak tree near Forest Hill. The species does not appear to be very well known by British entomologists; and, as M. Ragonot says, its synonymy is very perplexing.

MELISSOBLAPTES CEPHALONICA. (Pl. IV. fig. 3.)

BRIT. REF.:—

Melissoblaptēs cephalonica, Stainton and Knaggs, Ent. Ann. 1866, p. 147; Pryer, Ent. Mo. Mag. vii. p. 112; Barrett, *op. cit.* x. p. 272; Doubl. List, Suppl. p. 2; South, Syn. List, p. 21; Leech, Brit. Pyral. p. 110, pl. xii. fig. 5; Ragonot, E. M. M. xxii. p. 23.

Corecra cephalonica, Ragonot, *l. c.* p. 58.

Exp. al., ♂, 9 lines; ♀, 9½ lines. "Head white, the frontal tuft protruding, as in *Melissoblaptēs*, and concealing the short palpi of the male; the palpi of the female are short, drooping, the second joint being densely clothed with long scales, leaving

only the extreme tip of the terminal joint visible; antennæ pale grey, the basal joint thickened and greyish white. Anterior wings with the costa somewhat rounded (in the male specimens before me these have almost the form of a flattened ellipse, though this peculiar shape is less marked in the female); grey, with the nervures darker, especially those between the end of discoidal cell and the apex of the wing; hind margin spotted with dark grey. In the male specimen the costal portion of the wing has an ochreous tinge towards the base. Cilia pale grey, with the extreme tips a little darker. Posterior wings pale grey, somewhat transparent towards the anal angle; cilia paler grey. Thorax in front whitish grey, then grey, concolorous with the anterior wings. Legs pale grey."—(Stainton.)

Introduced by Dr. Knaggs in 1866.

BRITISH LOCALITIES.—Dover; London; York.

Note.—The original specimens, described by Mr. Stainton, were bred by Mr. Hind, of York, from dried currants. Mr. Barrett, writing in 1875, says that he found the species common in grocer's fruit warehouses, on September 21st, 1874; and, as he had previously met with two examples on July 31st of the same year, he concluded that they were probably stragglers of an early brood. This species is probably now in most collections.

THE SEXES OF LEPIDOPTERA.

By T. D. A. COCKERELL.

IN Entom. xxii. 177, I referred to the dwarfing of Lepidoptera produced by insufficient food, and quoted Mr. T. G. Gentry's opinion that a preponderance of males could be produced in this way, suggesting also that those who possessed dwarfs should examine them and report on the sex.

M. Alfred Wailly (Entom. 120) took exception to this view, and stated it as his experience that any preponderance of males observed at any time among dwarfs was purely accidental, and that he had found both sexes well represented when breeding from small cocoons. He did not seem to believe that the sex of insects could be influenced in any way.

While M. Wailly's evidence as to the sexes of dwarfs is very valuable, it must still be remembered that all animals which, when adult, have the sexes separate, are at a certain stage of larval or embryonic life potentially hermaphrodite; and it really becomes a sort of choice which group of organs, male or female, shall be developed. Gynandromorphs are those in which one side has developed male peculiarities, and the other female; such are well known among Lepidoptera. A snail is a true hermaphrodite, with both sets of organs functional.

I am not able to say whether Mr. Gentry's opinion, which I quoted, has any real foundation in fact or not; but to show that the idea of nutrition affecting sex is not confined to Mr. Gentry, I will quote from a very interesting paper, by Mr. F. E. Beddard, published in the 'Report and Proceedings of the Ealing Microscopical and Natural History Society for 1889.' Mr. Beddard, referring to birds, says (p. 55):—

"It appears that in many birds the males are very much more abundant than the females. . . . M. Stoltzmann himself reports 203 males to 87 females among humming-birds, collected by him in Peru. He attempted to explain this disproportion by the apparently observed fact that the better nourished eggs become females; the worse nourished eggs, males. The female, occupied with the cares of incubation, is not in a sufficiently healthy condition to produce many well-nourished eggs. Hence the greater number of births is of male birds."

Of course there is another way of looking at it, namely, that these eggs or larvæ which were to produce females needed most nourishment, and hence when semistarvation occurred the males would be able to survive on less, and would reach the adult stage, while the females would more often die. In this way the same result, a preponderance of males, would be observed.

3, Fairfax Road, Bedford Park, Chiswick, W., Oct. 12, 1890.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

(Continued from p. 312).

V.—THE CHEMICAL ASPECT (*continued*).

C.

HAVING thus, for the present, disposed of black, perhaps it would be as well to say a few words upon those eminently unsatisfactory colours Brown and Grey, although the gist of my remarks thereupon is really that there is nothing to be said! So far as I can understand matters at present, these greys and non-tints so common among Noctuæ and Geometers, the brown* shades also common in Noctuæ, and even perhaps the browns of many Bombyces, already enumerated, are all (physical) absorption colours, just as black is; excepting that instead of complete absorption of the light rays taking place, only some or most of them have been absorbed.

Wallace apparently considers† that all these dubious browns,

* See, however, the remarks on pp. 221 and 223.

† 'Tropical Nature,' p. 188. I ought to add, however, that in this passage Wallace is referring to animal colours generally, and not to insects specially.

greys, *et id omne genus*, are really pigment colours; but so far as I can at present interpret them, my experiments do not seem to countenance this view. And if black be admitted as a physical and not a pigment colour, then my view derives much support from the colour phenomenon, so abundantly displayed in the *Noctuæ*, where black shades off by the most imperceptible degrees into greys, duns, and browns.

D.

Since it is evidently best that we should dispose of all the disappointing and uninteresting colours in the first place, before passing on to those which have yielded some results other than nil to the experimenter, we will now consider the case of WHITE. As already explained, I had originally anticipated (as doubtless most would have done) that white would prove a very interesting colour. Its manifest connection with yellow, as seen in so many of the *Pieridæ*, *e. g.*, naturally suggested that it might be possible, by means of reagents, to promote in the partly or wholly white species colour changes (to orange and yellow), that nature had already brought about in neighbouring species; or, in part only, in an otherwise white species. But my readers fully understand by this time how fallacious were all such hopes; and after the arguments that I have already adduced to support the view that black is no pigment colour, but merely a physical absorption effect, it is hardly necessary here to do much more than propose the view that white is equally a physical colour, but due to reflection. As with black, so again here, I can instance the complete unanimity (always excepting *galatea* and the fringes of *Lycæna*, &c.) among experiments made on the most widely-sundered species,—an unanimity the more striking since there are manifest differences in appearance between the various whites. The whites of *Pieris*, *Vanessa*, *Hepialus*, *Larentia*, and *Liparidæ*, for instance, are by no means identical in appearance.

An argument against this view (of the non-pigmental character of white) might be found in the fact that many yellows—as I have myself shown—are turned white by most of the reagents employed; and from this fact it might be argued that if yellow—an acknowledged pigment colour—is convertible chemically into white, therefore conversely white must be a pigment colour, and convertible by some other reagents (if one only knew what “some”), or at any rate by Nature, into yellow. But this argument, if advanced, were altogether futile, and for this simple reason:—the yellows, *e. g.*, of *Colias* and *Euchloë* are not changed into white at all, in the sense that a yellow pigment becomes white; but the yellow pigment is dissolved out of the wing, leaving this of the same pure white that the primeval *Colias* and *Euchloë*, no doubt, displayed thousands of years ago. There^{fore}

in interpreting these experiments, it must not be said that yellow has been evolved *from* white, in the same sense as red has been evolved *from* yellow: this conception would be quite erroneous. Yellow, although evolved *on* or *in* a white wing, has not been evolved *from* white; that is to say, it has no genetic connection with white, as, for instance, red has with yellow. It is a necessary corollary, from this statement, that the so very usual connection of yellow and white (in the sense that probably most yellow species were formerly white) is, chemically considered, a mere accident or coincidence, and that there is no reason why yellow might not equally well have been developed on any other unpigmented* ground colour, as, for example, on a black, or grey, or brown.† Now the chestnut-coloured pigment, as I have strong reason to believe, is pretty closely related chemically to yellow, and is entirely analogous to yellow in that it also, though developed so commonly on originally white species (as is shown by the fact that reagents dissolve it out, and leave a white wing), has also no genetic relationship to white—no necessary connection therewith. In this connection, therefore, I consider it exceedingly interesting that the reactions with two chestnut species that offer apparently striking exceptions to the behaviour of the class generally, are really—according to the view just enunciated—quite normal; and in fact it is in the behaviour of these very species that we find a striking confirmation of this theory of the relations between chestnut and white, and therefore indirectly, and by analogy, of my theory concerning yellow also. But I must not further anticipate results that will be fully explained under subsequent headings.

With regard now to the absence of any white pigment, I do not think that we have here by any means so much cause for surprise as in the corresponding case of black; at least, so it seems to me now, looking at the matter in the light of past experience; but I am disappointed that my experiments should prove of no value in differentiating the various whites into different groups, and especially am I disappointed in the results of the special set of staining experiments.‡ After considering these carefully I cannot perceive that there are any particular inferences to be drawn, except that the whites of *Pieris* and *Melanargia* are somewhat different from the others—which we knew before. Now it had appeared to me (reasoning from the mere appearance of the different whites) that one might divide them into several groups, as, for instance:—1. *Pieris*; 2. *Melanargia*; 3. *Vanessa*, *Limenitis*, and perhaps the *Noctuæ* with white hind wings; 4. *Hepialus*; 5. *Lipariidæ*; and so on. Such an attempt at arrangement by superficial resemblance would, how-

* The reason for this restriction of "unpigmented" is of course obvious.

† Further consideration of this is deferred until Section 6.

‡ See page 220.

ever, be most laborious, seeing how imperceptibly one white shades off into another; and hence it was that I attached so much importance to the evidence that might be obtained by means of reagents. But such evidence is not forthcoming, and my hopes must be abandoned.

Let me now draw attention to the behaviour of some few species in particular. First, as to *Pieris*. The statement made some time since in 'The Entomologist,' that the white of *Pieris* is due to reflection from air-spaces, has already been quoted. I do not know on what evidence this view was originally put forward by Dr. Dimmock, but it appears to me to be supported by the reaction with staining reagents. The effect of methyl-aniline green and violet (see Table, p. 220) was to produce an apparent *thickness* of colour, such as I saw in no other instance. The appearance of the stained wing strongly suggested to me the thought that this "thickness" was due to the stain filling up these air-spaces.*

Next as to *Melanargia galatea*. I drew special attention, in the Table, to the fact that this species had been stained by methyl-aniline violet a different colour from that produced in any other species. It is of course impossible to convey, by a mere description, the difference in appearance between this and other stained species; but I think that anyone who had *seen* the experiments would have felt as I did, that in the unique appearance of *galatea* we had additional illustration of its unique constitution,—its difference from other white species. But with regard to the yellow produced by various reagents in this species, no doubt it will be asked what explanation, if any, can be offered of this exceptional and anomalous behaviour of *galatea*: why should it react in a manner so contradictory and opposed to all that one might expect,—judging from the other experiments? Well, after studying the question, I conclude that the anomaly and exception—striking though they seem—are apparent only, and not real; that if the views laid down in foregoing paragraphs be assented to, there is here no real difficulty at all. Nay, more, the reactions of *galatea* may be interpreted as lending additional support to my theory; and, in fact, I am confirmed in my views by the independent support that they derive from this behaviour of *galatea*, since I was originally led to such conclusions without any reference to the phenomenon now in question. If, however, my views be entirely wrong,—if there be a white pigment which gradually developed into yellow or chestnut,—if the destruction of yellow and chestnut by reagents be due not to a solution of the pigments,

* In this connection I might add that the white of some species of flowers is certainly due to this cause. If pressure be applied the air-spaces are broken, the white disappears, and a colour appears, due to a pigment present in slight quantity, whose effect was apparently veiled before.

but to a retrogressive modification of yellow or chestnut into white pigment,—then I admit that in *Melanargia galatea* we have a glaring difficulty. But, granting my theory, the difficulty is apparent only.

Let me explain this. It is admitted pretty generally that the pigments of animals, and of flowers also,* are, physiologically considered, waste products. At any rate it can hardly be doubted that they are decomposition products, due to the breaking down of a large and complex molecule into several less complex. In vegetable physiology it seems pretty well established that the most various substances—as starch, mucilage, tannin, resin, gum, oil,† &c.—are all formed by a decomposition of the protoplasm that is incessantly going on; and it is only in accord with all analogy and observation to expect that the chlorophyll (or rather its forerunner etioline, or perhaps a mother-substance of this) is either a direct decomposition product of the protoplasmic molecule,‡ or a simple compound of such decomposition product with another body found in the cell; and the various plant pigments—or at least many of them—are closely related to chlorophyll. Similarly, in animals, it is very probable that such pigments as bilirubin, urobilin, lutein, &c., are derivatives of hæmoglobin, which is no doubt a decomposition (katabolic) product of the protoplasm.§ I have quoted the above facts to show that I am only assuming that there holds good for insect pigments what is an universal phenomenon of physiology; and now I can state very simply what seems to me the explanation of the reaction with *galatea*. I take it that in this species the metabolic processes have not yet produced any pigment, but *very nearly so*; that there exists in the wing a very unstable *mother-substance* (itself a decomposition product, whether produced immediately from the protoplasmic molecule, or mediately from a molecule of intermediate complexity); and that the action of any powerful reagent is to decompose this into a yellow pigment, and something else that does not concern us at present. This view, although at present necessarily somewhat hypothetical,|| offers a satisfactory explanation of the apparent anomaly in *galatea*.¶ One objection may

* "The colouring matters of plants may be regarded simply as waste products in so far as their direct use in constructive metabolism is concerned."—(Vines' 'Physiology of Plants,' p. 242.)

† Cf., e.g., Vines' 'Physiology of Plants,' *passim*; &c.

‡ Vines' 'Physiology,' p. 241. Also Dr. Schunck, on the "Chemistry of Chlorophyll," in 'Annals of Botany' vol. iii.; and of an abstract in the Microscopic Society's journal for this year, pp. 196, 197.

§ Cf. Michael Foster's 'Text-Book of Physiology,' *passim*.

|| I hope before long to have an opportunity of examining these various pigments by a method sufficiently obvious, which I hope may give us a far clearer insight into their constitution and affinities.

¶ It is of course an essential corollary from this that *galatea* may be expected *one day* to become yellow,—by perfecting its decomposition processes! As a matter of fact I may point out that already (in the *female*) the presence of the "mother-substance" of the pigment has produced a slight yellowish-cream tinge.

still be raised, viz., that, granting the above, yet the yellow pigment, as soon as produced, ought to be dissolved by the reagents employed, leaving the wing finally colourless, as in *Euchloë* or *Colias*, for example. To which I reply that, in the first instance, not all yellows are dissolved; and, in the second, that on repeating my experiments with special reference to this point, I find that in every case the reagent which produces the colour also dissolves it (a fact observed from the first as true of some reagents), leaving a colourless transparent wing. So that we may fairly consider *galatea* to offer no contravention to the general rule.

The next species to which I will call attention is *Amphidasys betularia*. Knowing that buff-coloured varieties of this species occur, I was exceedingly interested to learn how reagents would affect this white. Most of them were absolutely without effect (as usual), but after treatment with sulphuric acid there were one or two very small but distinct buff spots or marks on the wing. The same effect was produced by potassic permanganate, and somewhat doubtfully by tannin and by gallic acid. This was rather exciting; and, in the hope of transforming the white entirely, I specially experimented by submitting wings of this species to the action of sulphuric acid for an entire week. To my great disappointment, however, at the expiration of that period, the white was really not affected at all, except that the veins were buff. Had the experiment succeeded we should have had a companion case to that of *galatea*; but as it is I am somewhat a loss to understand why such a very trifling effect was produced, and nothing more. It is, however, very possible that this species is in an analogous condition to *galatea*, but that the "mother-substance" of a pigment is in most specimens less far advanced in the metabolic progress. I should dearly like to test (if there be such) a white specimen bred from one normal and one buff parent, — since one might expect that in this instance a pigment could be readily produced by the same method as in *galatea*. If so, one might next experiment on a "quadron" specimen, and so on.

Of the remaining species there is very little to be said. The peculiar behaviour of *Hepialus humuli* may be pointed out. I cannot understand why this white, which presents such a fine, almost polished, appearance, should "go transparent" under the action of most reagents. But this is a puzzling and unsatisfactory species altogether. The natural quasi-transparency of the white in *Vanessa*, *Limenitis*, and many Noctuæ and Geometræ, was even more evident under the influence of various reagents; and with this may, perhaps, be correlated the fact that they stained so very slightly (see p. 220).

With this, I think, concludes all that need at present be said about white, and we may now pass to the consideration of some pigment colours.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

PLUSIA MONETA IN BRITAIN.—It may be worth recording that on 1st July last I captured at light, in a wood near here, a very fine specimen of *Plusia moneta*. Messrs. Watkins and Doncaster identified it. I also took a specimen of *Acronycta alni* in June, at sugar.—R. A. DALLAS BEECHING; 24, St. James' Road, Tunbridge Wells, October 2, 1890.

[Mr. C. G. Barrett, in the October number of *another magazine*, to wit the 'Entomologist's Monthly,' has a most interesting note on the occurrence of this species in England, in which he mentions the capture of two other specimens. One of these it appears was taken on the evening of 25th June last, by a schoolboy, as it was hovering over a flowering plant of *Delphinium* in a garden at Dover. The other example was seen on the night of 2nd July, flying around one of the gas-lamps at a railway station near Reading, and was secured by Mr. W. Holland. It is, perhaps, noteworthy that the last specimen referred to was taken at light on the same evening that Mr. Christy found one in his illuminated moth-trap (Entom. 254). At the last meeting of the London Entomological Society, Mr. Kirby remarked that *Plusia moneta* had occurred in some numbers in Holland.—ED.]

PLUSIA MONETA.—With reference to the description of the larva (Entom. 288), it is correct. I have preserved specimens in my collection. Of this species there is a not uncommon variety of the imago in Amurland (Siberia), in which the fore wings are shining silver-white, instead of the golden grey in the type. I have specimens of both.—N. F. DOBRÉE; Beverley, Yorks.

ACRONYCTA ACERIS IN SEPTEMBER.—I took a specimen of *Acronycta aceris* at Enfield, on the evening of the 17th September last, at sugar. Is not this a very late date for this species?—H. D. SYKES; "The Cedars," Enfield, Middlesex, October 11, 1890.

HELIOTHIS ARMIGERA AT CHATHAM.—On the 5th of last month, while I was strolling about the waste ground at the extension-works in Chatham Dockyard, I disturbed a fine specimen of this moth, which fluttered up from among some rank herbage at my feet, and settled again a few yards off. Unfortunately, I had not a net with me, and my efforts to secure it in my cap were unavailing, as it was too wary and active, and eventually took a long flight, and I saw it no more. This is only the third example I have met with in England during the many years I have been collecting.—GERVASE F. MATHEW; H.M.S. 'Tyne,' Gibraltar, October 4, 1890.

VARIETIES OF ARCTIA CAIA.—Referring to Mr. W. T. Pearce's note on *Arctia caia* (Entom. 291), I may mention that I have this year bred a female specimen of *A. caia* with the usually white portion of the fore wings suffused with a pale pinkish hue. I may add that I obtained the larva (with others) from Walthamstow in the spring, and fed it principally on dock, though I gave it lettuce for a day or two.—HENRY A. HILL; 132, Haverstock Hill, Hampstead, N.W., Sept. 15, 1890.

On the 24th of July a boy brought me a fine dark female of *A. caia* to pin and set for him. It had certainly rubbed itself a little, but only slightly. Fore wings deep chocolate; hind wings black, except at the base, which is reddish orange; abdomen black, with a narrow red

stripe at each side. The boy found twelve larvæ, six of which he gave to me. Mine produced the ordinary form, whilst from one of the six he kept the above var. was obtained. I should add that the larvæ were found at the edge of Laxley Moor, about five miles from Sheffield.—J. BATTY; 65, Fawcett Street, Sheffield, September 22, 1890.

LARVA OF *DILOBA CÆRULEOCEPHALA* ON LAUREL.—In reference to Mr. Butler's note on the food-plant of *Diloba cæruleocephala* (Entom. 327), I may state that for the last three years I have taken plenty of the larvæ of this species off the laurel bushes in the college grounds. I tried feeding them on whitethorn, but they seemed to prefer the laurel. It would be interesting to know how these larvæ manage to neutralize the hydrocyanic acid contained in the leaves of their food-plant, and which is so fatal to them in the perfect form.—D. H. S. STEWART; Radley College, Oxford.

[In 'Weekly Entomologist,' i. p. 94 (1862), Rev. J. Hellins writes, "*D. cæruleocephala*. A number of larvæ once found on laurel."—E. A. F.]

HERMAPHRODITE *TRICHIURA CRATEGI*.—On the 26th August last, I bred a distinctly hermaphrodite specimen of the above moth. The right upper wing bears an exact resemblance in shape, colour, and markings to that of an ordinary male, whilst the opposite wing has all the characteristics of the female. The underwings are, unfortunately, very imperfectly developed, but it can be seen that they are identical with those of a male and female respectively; as also are the antennæ. I would also mention that the left side of the body and corresponding legs are brown, the opposite side and legs being grey, and agree with the colours of the respective sexes.—W. H. JACKSON; 4, Queen Anne Villas, Grove Road, Walthamstow, September 24, 1890.

NOTES ON THE SEASON.—The following observations, in addition to those which have already appeared in the 'Entomologist,' of the season which is fast closing, may be of interest. The notes taken refer to parts of North Somerset until the middle of June, and to the lower part of South Wales until the end of September, with the exception of the latter part of June on the Cotswolds. In January and February I frequently noticed *Phigalia pedaria* (*pilosaria*) at rest and on gas-lamps in Bath. Noctuæ, frequenting the sallow bloom, were fairly abundant in different localities, but not nearly so much so as the previous season. *Tephrosia crepuscularia*, *Anticlea badiata*, and *Selenia bilunaria* were fairly abundant. Of the Rhopalocera, *Euchloë cardamines*, *Lycæna icarus*, and *L. minima* were plentiful, the last named locally so. Larvæ of the spring and early summer feeding species were very abundant, notably *Zygæna filipendulæ*, *Bombyx neustria*, *Hybernia defoliaria*, *Oporabia dilutata*, *Selenia bilunaria*, *Crocallis elinguaris*, *Himera pennaria*; and the oak trees were completely riddled by myriads of *Tortrix viridana*. On the Cotswolds, *Lycæna icarus*, *Argynnis euphrosyne*, and *Euchloë cardamines* were common; the last named was observed on June 25th, the latest. In Wales I found species very variable in numbers, some of the commoner, as *Xylophasia monoglyphia*, *X. lithoxylea*, *Triphæna pronuba*, *Apamea didyma* (*oculea*), *Phlogophora meticulosa* (September), being very abundant; whilst, on the other hand, less common species were conspicuous by their absence. The second brood of the Pieridæ was extremely plentiful; also *Lycæna icarus*; *L. astrarci* fairly so; *Hesperia thaumas* was common; and *Argynnis paphia*, *Vaneio*, and *V. urticæ* were in fair numbers; but I did not observe *V. car*

"Sugaring" during the season was little more successful than last year, the scarcity of some species being, I believe, the cause, on account of their absence on favourable evenings. As a consequence of the abundance of larvæ, doubtless, the Ichneumonidæ were numerous early in the season; so also were the "sawflies."—T. B. JEFFERTS; (Clevedon) Cirencester.

APAMEA OPHIOGRAMMA AT HAMPSTEAD.—It may be of interest to the readers of the 'Entomologist' to know that I took in my garden here two specimens of *Apamea ophiogramma*; the first on June the 23rd, and the second on August the 12th.—E. H. EVANS; 3, Thurlow Road, Hampstead.

[Probably our correspondent has some of the ornamental ribbon-grass growing in his garden. This plant is said to be the food of the larva of *A. ophiogramma*.—ED.]

OXYPTILUS LÆTUS ON THE KENTISH COAST.—I captured some specimens of this plume-moth, on June 8th, between Dover and St. Margaret's Bay. On July 13th I took a few more at Deal, or, rather, at the Sandwich end of the sand-hills.—W. PURDEY; 129, Sea View Terrace, Folkestone.

ZANCLOGNATHA EMORTUALIS.—It may perhaps interest you to learn that I possess a good specimen of this insect, which was taken a good many years ago by the Rev. W. T. Bree, of Allesley Rectory, near Coventry, but I do not know any of the particulars of its capture.—(Rev.) HENRY BURNLEY Wavendon Rectory, Bletchley Station, Bucks, October 4, 1890.

[On June 12th, 1859, the late Mr. Charles Healy beat a specimen *Z. emortualis* out of a beech tree near the King's Oak, Epping Forest (E. W. L. vii. 188; Zool. xx. 8296). Mr. Machin exhibited it at the Entomological Society of London on December 2nd, 1861. I saw the specimen sold at Stevens's a few years ago, but I forget the date and who was the purchaser.—E. A. F.]

SCARCITY OF LEPIDOPTERA.—I spent the first three weeks of August at Staplefield, near Crawley, Sussex. The weather was bad for the time of year, being cold and wet nearly every day, with an occasional thunderstorm. As far as appearances went the country looked very promising for collecting in. There were numerous small woods close to the house in which I was staying, with rough fields between them. Beating the hedgerows by day only produced a few of the commonest *Geometræ* and *Tortricæ*, while sugaring was an utter failure, as I did not see a single moth, although the evenings when I tried were, to all appearances, most favourable, being calm and damp. The only larvæ noticed were a few broods of *Pygæa bucephala* and a solitary *Smerinthus ocellatus*.—GERVASE F. MATHIAS; H.M.S. 'Tyne,' Gibraltar, October 9, 1890.

LIST OF BUTTERFLIES TAKEN AND SEEN NEAR AND AT MONMOUTH IN SEASONS 1889 AND 1890. — PIERIDÆ. — *Gonepteryx rhamni*. *Pieris brassicæ*, *P. rapæ*, *P. napi*, common. *Anthocharis cardamines*, common. NYMPHALIDÆ.—*Argynnis paphia*, common; *A. adippe*; *A. euphrosyne*, plentiful; *A. selene* (?). *Melitæa artemis*, Cwmcarvan. *Vanessa c-album*, plentiful; *Vanessa urtica*, plentiful; *V. polychloros*, 1 specimen, Aug. 23rd, 1890; *V. io*, common; *V. atalanta*; *V. cardui*, occasional. APATURIDÆ.—*Apatura iris*, several (two females taken while settled on ground). SATYRIDÆ.—*Melanargia galatæa*; *Pararge egeria*, plentiful; *P. megara*, plentiful. *Epinephele ianira*, plentiful; *E. tithonus*, not common; *E. hyperanthus*, fairly plentiful. *Canonympha pamphilus*, common. LYCENIDÆ.—*Thecla*

rubi, in June; *T. quercus*, not common; *T. w-album*, 1 specimen, July 29th, 1890. *Polyommatus phlaas*. *Lycæna icarus*; *L. argiolus*. HESPERIIDÆ. —*Syrichthus alveolus*, plentiful. *Thanaos tages*, plentiful. *Hesperia sylvanus*, fairly common; *H. thaumas* (= *linea*), fairly common.—(Rev.) GERARD W. PALMER; The Vicarage, Monmouth.

ABUNDANCE OF CERTAIN LARVÆ.—As a set-off against the scarcity of Lepidoptera, I have to record the extreme abundance of *Eupithecia* larvæ at Chatham and Sheerness. At the former place there is a considerable tract of waste land in that part of the Dockyard known as the "Extension Works." This, at the beginning of September, was overgrown with a profusion of wild flowers, consisting chiefly of ragwort, sea aster, thistles of various kinds, willow herb, *Chenopodium*, *Atriplex*, coltsfoot, chamomile, &c. In the former the larvæ of *Eupithecia oblongata* (*centaureata*) and *absynthiata* literally swarmed, as many as fifty being knocked out of a single bunch of flowers, and hardly any two larvæ were exactly alike, so it is possible there may be other species than the two mentioned. From *Chenopodium* and *Atriplex* larvæ of *E. subnotata* were freely obtained, together with a sprinkling of *Hadena trifolii* (*chenopodii*) and *oleracea*. At Sheerness, towards the end of September, I found *Chenopodium* and *Atriplex* growing luxuriantly on the sea-bank beyond Marine Town; and here the larvæ of *subnotata*, *chenopodii* and *oleracea* were in prodigious numbers, and the latter might be seen in hundreds feeding fully exposed during the day, and stripping the erect stems of the *Atriplex* of every vestige of flower, seed, or leaf. After lifting with my walking-stick and shaking the trailing stems of one moderate-sized plant of *Chenopodium*, I counted more than a hundred larvæ of *E. subnotata* lying on the ground below. The grey-coloured larvæ were in proportion of 6 per cent. to the green ones.—GERVASE F. MATHEW.

AUTUMNAL LARVÆ.—In the neighbourhood of Lowestoft, this year, where I stayed from middle of August to middle of September, the larvæ, even of the common kinds, were conspicuous by their absence, with one exception, that of *Euchelia jacobææ*, which were in large numbers, every small plant of ragwort having five or six on it. In this neighbourhood (St. John's Wood) many gardens are stripped by the larvæ of *Mamestra brassica*, *M. persicariæ*, *Pieris brassica*, and other common species.—T. G. WILLIAMS; 13, Elm Tree Road, St. John's Wood, Oct. 13, 1890.

ANOTHER PLAGUE OF CATERPILLARS.—Many of your readers, no doubt, are already aware of the extraordinary abundance this autumn of the larvæ of *Liparis monacha* in Southern Germany, and especially in Bavaria; and as I have not seen it noticed in the 'Entomologist,' it may be useful to do so for the sake of future reference. A letter in the 'Standard' newspaper, of 23rd August, gives a good descriptive account of the havoc it has created; and the 'Illustrirte Zeitung,' of 6th September, deals with it in greater detail. From this it can only be likened to a plague of locusts in and around Munich. It seems to have committed equal havoc in the woods in Northern Germany, as in Oldenburg, alone, seventy hectares were totally stripped by the larvæ, fir appearing to be chiefly affected. The same article states that the devastation is periodical in Western Russia and in East Prussia, where, within the last fifty years, "hundreds of square miles (German)" have been laid bare. On the last occasion, the plague was stopped by heavy gales of wind, which drove the insect in clouds over the Baltic, to be drowned there, and afterwards to be

washed up in such abundance "as to be carted away for manure"! What an opportunity our variety hunters have lost. Strangely enough, the 'Societas entomologica' makes no allusion to its extraordinary profusion this year.—N. F. DOBRÉE; Beverley, E. Yorks.

A LONG DAY'S COLLECTING.—I was staying at Wicken, and on Sunday, July 20th, I drove into Ely to meet my brother, who was coming to see some collecting in the Fens, and I planned a long day for the morrow. We arranged with the bricklayer for the hire of his pony and cart, and started next morning for Tuddenham. As we drove along we kept our eyes open for moths sitting on the roadside trees and fences. When we reached the sandy soil of Suffolk, with its belts of fir trees, we carefully searched a Scotch fir plantation, and were rewarded by finding two specimens of *Anticlea sinuata* at rest on the trunks, also two *Pseudoterpna pruinata* (= *cytisaria*), several *Acronycta psi*, *Hecatera serena*, &c. Further on along the road we found one *Thera firmata* and two *Porthesia auriflua*, the latter just emerged and drying their wings. Of the *A. sinuata* one was a female, so I kept it alive for ova; it laid eggs freely on the flowers and stalks of the lady's bedstraw (*Galium verum*). The eggs were bright yellow, and resembled the unopened buds of the *Galium*,—consequently were very difficult to distinguish. (The larva is very handsome; it has a gamboge-yellow stripe along the middle of the back, and on each side of this stripe is one of jet-black. The lower half of the body is green. The larvæ were full fed at the end of August, and made cocoons on the surface of the ground, or, a few only, among the flowers and seeds of the *Galium*.) When we reached Tuddenham we tied up our pony to a fence, and, leaving him to eat his corn, we made a search for the larva of *Lithostege griseata*. It feeds upon a species of wild mustard (*Sisymbrium Sophia*). The plant, when in seed, has a light, waving, and almost feathery appearance; it grows in neglected corners of cultivated fields, and sometimes among the corn itself. The larva is not easy to find, as it very much resembles the seed-pods upon which it feeds, both in its shape and colour. We took about fifteen, and then gave it up, and drove back to the top of Tuddenham Hill, there to look for the larva of *Dianthæcia irregularis* on its food-plant, *Silene otites*, an inconspicuous little plant growing among the grass at the roadside. Of the few larvæ which we found I took two that were partially inside the seed-pod, and this gave me the clue to what had puzzled me about this larva last year. I had on that occasion gathered a bunch of the *S. otites* for food. There were no eggs upon it that I could discover. This bunch of food was tied up in a bag, and a week subsequently I found upon it quite a number of larvæ of *D. irregularis*, all about one-third of an inch long or larger. No doubt they were already hatched when I gathered the *S. otites*, and they were feeding concealed within the seed-pods after the manner of the rest of the genus *Dianthæcia*, but the smallness of the seed-pods had misled me. By this time it was four o'clock, and, being still a dozen miles from Wicken, we began to turn our heads homewards. It was a beautiful day, and from the top of Tuddenham Hill the cathedral at Ely was plainly to be seen at a distance of some twenty miles. On our way home we stopped at the village of Fordham, and after tea, at the 'Dragon,' we walked down to Chippenham Fen (we had obtained leave to collect there). On our way through the fields we beat an old high thorn-hedge, and secured one *Toxocampa pastinum*, one *Nudaria mundana*, one *Macaria liturata*, and one *Acidalia imitaria*. A few days previously I had beaten out of this

same hedge six fresh specimens of *Aventia fleacula* and lots of Geometræ. While waiting for the dusk to come on we walked about among the sedge, and took a few *Cænobia rufa* (= *despecta*) flying over ditches. Chippenham Fen is cut up and intersected by belts of trees; along the outsides of these belts are wide rides. At the edge of these rides and about the ditches grow masses of hemp agrimony, the food-plant of *Plusia orichalcea*. This was our particular quarry, and very exciting it was watching for this rare moth at the thistle-heads, in the dim light, while the nightjars rattled and the fen gnats sang round one's mosquito veil. Many a dash did we make with the net, and mostly was it only a despised *P. chrysitis* that we had caught. Still we managed to secure four specimens of *P. orichalcea* that evening. It was a very warm night, and lots of things were on the wing; we took *Hepialus humuli* (rather late I think), and three specimens of *Toxocampa pastinum*; but we did not stop after darkness had fairly set in. When we got back to Wicken it was 11 p.m. One *Pelurga comitata* and one *Cidaria imitaria* were flying about in the house, and, having secured these and eaten a mouthful of supper, we walked down to Wicken Fen, where Bailey was already at work with the "light." He had got several moths; among them one *Pterostoma palpina*, one cream-coloured variety of the male *Odonestis potatoria*, one *Bombyx quercus*, two or three battered *Lasiocampa quercifolia*, *Epione apiciaria*, and lots of *Acidalia immutata*. The air had now turned chilly, and nothing much came to the light for some time, so we "shut down" the light, as they say in the Fens, and went for our beds, the only further catch of any note being one *Tapinostola helmanni*, the first of the season. The season was very late in the Fens this year; flowering plants appeared to me to be three weeks behind last year, and many of the moths and larvæ also.—W. M. CHRISTY; Watergate, Emsworth.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—Oct. 1st, 1890. The Rt. Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. The Rev. Dr. Walker exhibited, and read notes on, a long and varied series of forms of *Crymodes exulis*, collected in June and July last in Iceland. In reply to a question by Lord Walsingham as to whether all the forms referred by Dr. Walker to *C. exulis* had been identified as belonging to that species, Mr. Kirby said the species was a very variable one, and that several forms had been described from Labrador and Greenland. Mr. South stated that he had examined Dr. Walker's specimens, and he believed that most of the forms exhibited had been described by Dr. Staudinger, in his papers on the Entomology of Iceland, as varieties of *C. exulis*. Dr. Sharp exhibited a specimen of *Ornithomyia avicularia*, L., taken near Dartford, to which there were firmly adhering—apparently by their mandibles—several specimens of a mallophagous insect. He also exhibited some specimens of fragile Diptera, Neuroptera, and Lepidoptera, to show that the terminal segments in both sexes might be dissected off and mounted separately without the structures suffering from shrivelling or distortion. Dr. Sharp also said, in reference to the statement made by him, on p. 421 of his paper recently published in the 'Transactions' of the Society, as to the number of the segments of the abdomen, and the position of the genital orifice in the female of Hemiptera-Heteroptera, that he had recently been making some dissections, and found that the structures externally were difficult of comprehension, and he now thought

that the statement he had made from observation, without dissection, might prove to be erroneous. Mr. G. F. Hampson exhibited and remarked on a series of *Erebia melas*, taken in July last, in the Austrian Alps (Dolomites), by Mrs. Nicholls. Captain Elwes observed that this species was abundant in the Pyrenees; but although he had frequently suggested to Dr. Staudinger and other European lepidopterists that it probably occurred in the Swiss or Austrian Alps, he had never been able to obtain specimens from any part of Europe except the Pyrenees; and that it had been left to an English lady to be the first to take a species of *Erebia* new to these Alps. He added that the species only frequented very steep and stony slopes on the mountains, so that its capture was attended with difficulty. Mr. McLachlan exhibited specimens of an extraordinary Neuropterous larva found by Mr. B. G. Nevinson in tombs at Cairo. He said that this larva had been assigned to the genus *Nemoptera* by Schaum, who described it as having been found in tombs in Egypt (Berl. Ent. Zeitschrift, vol. i.); and Roux had previously (Ann. Sci. Nat. t. xxviii.) described and figured it as an abnormal apterous hexapod under the name of *Necrophilus arenarius*. Mr. Nevinson supplemented these remarks with an account of his capture of the specimens in the Egyptian tombs. Mr. G. T. Baker exhibited a series of forms of species of the genus *Boarmia* from Madeira; and also a series of melanic varieties of *Gracilaria syringella* from the neighbourhood of Birmingham. Mr. W. F. H. Blandford exhibited and remarked on a series of specimens of *Dermestes vulpinus*, which had been doing much damage to the roofs of certain soap-works in the neighbourhood of London, where it had no doubt been introduced with bones and fat. Mr. R. W. Lloyd exhibited a specimen of *Carabus catenulatus*, in which the femur of the right fore-leg was curiously dilated and toothed. He stated that he took the specimen at Oxshott, Surrey, on the 27th September last. The Rev. C. F. Thornehill exhibited a black variety of the male of *Argynnis aglaia*, taken by himself in July last on Cannock Chase; also a number of living larvæ of a species of *Eupithecia* feeding on the flower-heads of *Tanacetum vulgare*, collected in a limestone quarry in Leicestershire. He expressed some doubt as to the identity of the species, but the general opinion was that the larvæ were only those of *Eupithecia absynthiata*. Mr. G. Bryant sent for exhibition a variety of the larva of *Trichiura cratægi*. Mr. C. G. Barrett exhibited a specimen of *Plusia moneta*, Fabr., a species new to Britain, taken at Reading by Mr. W. Holland in July last. It was stated that the first specimen of this species captured in this country had been taken at Dover last June, and was now in the collection of Mr. Sydney Webb, of that town. Mr. Kirby said that Mynheer Snellen had reported this species as being unusually common in Holland a few years ago. Mr. W. Dannatt exhibited a variety of *Papilio hectorides*, ♀, from Paraguay. Mr. Osbert Salvin said he believed he had seen this form before. Mr. C. J. Gahan exhibited a curious little larva-like creature, found by Mr. Green in a rapid mountain stream in Ceylon, and observed that there was some doubt as to its true position in the animal kingdom. It was made up of several distinct segments, each of which bore a single pair of laterally directed processes or unjointed appendages. Mr. Hampson remarked that these appendages were very suggestive of the parapodia of certain chaetopod worms, but that all the known polychætous worms were marine. Lord Walsingham and Mr. McLachlan expressed an opinion that the animal was of myriopodous affinities, and was not the larva of an insect. Mr. Baker read a paper entitled "Notes on the genitalia of a gynandromorphous *onia hippia*."—H. Goss, Hon. Sec.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
 —Sept. 25th, 1890. J. T. Carrington, F.L.S., President, in the chair. Mr. S. C. G. Russell exhibited interesting varieties of *Zygæna trifolii*, Esp., including var. *confluens*, Stgr., from the New Forest. Mr. Mera, *Acronycta ligustri*, Sch., from South Devon; also a banded variety of *Argynnis euphrosyne*, L., from Chattenden. Mr. E. Joy, two forms of the under side of *Lycæna minima*, Fues. Mr. C. Fenn, *Cidaria immanata*, showing all the varieties generally occurring at Aberdeen; also dark varieties, from York; specimens of *Agrotis cursoria*, Bork., from Aberdeen, showing the extremes of variation there; and a specimen of *Ephestia ficulella*, Bor., taken in the Society's rooms. Mr. J. Jäger, box of insects taken in the Isle of Man, including *Epunda nigra*, Haw., *Stilbia anomala*, Haw., *Agrotis tritici*, L., and a few specimens of *A. simulans*, Hufn., &c., taken at the flowers of ragwort; also *Cirrhædia xerampelina*, Hb., which Mr. Jäger stated were mostly found at the bottom of the ash trees, among the dead leaves, which the moth closely resembled. Among the other exhibits of Mr. Jäger were some specimens of *Callimorpha hera*, L., and he remarked that he was somewhat surprised to find that there was still some doubt as to the authenticity of the captures in Devonshire: some discussion ensued, in the course of which Mr. C. G. Barrett stated that there was no doubt about the authenticity of the recent captures,—the difficulty referred to its probable introduction. Mr. Wellman, series of *Hyponomeuta padellus*, L., *H. cagnagellus*, Hb., and *H. evonymellus*, L. Mr. R. Adkin, larvæ of *Apamea occulta*, L., some having obtained full growth; also *Myelophila cribrum*, Schiff., and *Homæosoma binævella*, Hb., from the Essex coast, and remarked upon the protection afforded to these two species when resting upon thistles, by their resemblance to the seeds of certain grasses. Mr. Bright, a box of varieties of Lepidoptera, including many of the genus *Argynnis*, the black form of *Limenitis sybilla*, L., forms of *Taeniacampa gracilis*, Fb. (New Forest), *Boarmia repandata*, L. (Scotch), and of *Vanessa urtica*, L., &c. In reply to Mr. Tutt, who expressed an opinion that the last-named was an example of *V. milberti*, Mr. Bright said that the specimen had been sent him by a Mr. Mumford, and was said to have been taken at Polegate in 1888.

Oct. 9th.—The President in the chair. Mr. W. E. Butler, of Reading, was elected a member. Adverting to the specimen of *Vanessa* exhibited at the last meeting, and said to have been taken at Polegate, Sussex, Mr. Jenner Weir stated that, in his opinion, the insect in question was *Vanessa milberti*, a well-known North American species, of which he exhibited specimens from the Canadian North-west provinces, and also specimens of *V. urtica* from Hong Kong, Luleo in Sweden, and St. Petersburg, showing how very little the species varied in these widely separated localities, differing also so much as they did in climate, Hong Kong being within the tropics, and Luleo but just outside the arctic circle. Mr. C. G. Barrett exhibited the specimen of *Plusia moneta*, Fab., taken near Reading by Mr. Holland, and stated that, in his opinion, the species was moving northwards. Mr. South, specimens of *Noctua festiva*, Hb., with varieties, and made remarks thereon. Mr. C. Fenn, *Tryphæna comes*, Ill., var. *curtisii*, Newm., and dark forms from Aberdeen; *Agrotis simulans*, Hufn., *Acronycta euphorbiæ*, Fb., *Agrotis nigricans*, L., *Sciaphila octomaculana*, Haw.,—all from Shetland, and showing a melanice tendency. Mr. Tutt, on behalf of Lieut. Brown, *Agrotis simulans*, Hufn., from Portland, with Scotch examples for

comparison. Mr. T. D. A. Cockerell, *Colias eurytheme*, Bdv.,—forms (1) *amphidusa*, Bdv., (2) *keewaydia*, Edw., (3) *ariadne*, Edw., (4) *eriphyle*, Edw., from the United States,—and made remarks relative to his exhibit. Mr. E. Joy, living larvæ of *Toxocampa pastinum*, Tr. Mr. Tugwell, bred specimens of *Heliophobus hispidus*, Hb., and said it was just possible in some of the specimens to see a violet tinge. Mr. A. E. Cook exhibited nests of *Vespa sylvestris* from Bagshot, Surrey. Mr. Moore, nests of several species of British and foreign wasps. Mr. Billups, *Epeolus productus*, Thoms., taken at Chobham; also a series of *Trichomma enecator*, Rossi, bred by Mr. Adkin from *Peronea hastiana*, L.; and male and female *Pelecystoma lutea*, Nees, bred by Mr. Adkin. Mr. Billups contributed notes relative to his exhibit.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—September 15th, 1890.—Rev. C. F. Thornewill, V.P., in the chair. Mr. C. Runge, Broad Street, Birmingham, was elected a member. Mr. E. C. Tye showed *Cymatophora duplaris* from near Tamworth. Mr. G. W. Wynn showed *Eupheria fulvago*, taken by Mr. Tye, on Cannock Chase, at rest on bracken. Rev. C. F. Thornewill showed *Cidaria populata* and *testata*, and *Eucosmia certata*. Mr. P. W. Abbott showed *Bourmia repandata*, including var. *conversaria*, taken on sugar at Porlock, Somersetshire. Mr. R. C. Bradley read a paper "On three days' collecting on Cannock Chase in August," and showed the insects taken, which included *Helophilus trivittatus* among Diptera, and *Chrysoclista bimaculella* among Lepidoptera.

October 6th.—Mr. W. G. Blatch, President, in the chair. Mr. P. W. Abbott showed *Xylophasia scolopacina* from Arley. Mr. W. G. Blatch showed *Homalota crassicornis*, a beetle which he believed to be new to England: the only record with which he was acquainted of its capture in Britain was of three specimens taken in Scotland. He also showed *Euryphorus picipes*, a beetle new to the Midlands. Mr. W. Harrison showed a small collection of insects made this year in the New Forest, between July 19th and 26th, and described his experiences there.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

OBITUARY.

OWEN S. WILSON died at Cwmffrwd, Carmarthen, on the 25th of August last. He was the only son of the late Mr. John Wilson, County Court Judge in South Wales, and Recorder of Carmarthen; a barrister by profession, though he had not been practising for some years. He appears to have been a zealous Volunteer, and had attained the rank of Lieut.-Colonel after twenty years' service. In 1874 he was elected a Fellow of the Entomological Society of London, and has long been known as a most ardent and hard-working lepidopterist. His 'Larvæ of the British Lepidoptera,' an important work of 367 pp. and 40 coloured plates, published in 1880, met with a most favourable reception at the hands of Lepidopterists. For some time past he had been actively engaged in preparing for the press a more comprehensive work, dealing with the Life-Histories of Lepidoptera, in which it was proposed to give plates, each representing life-sized figures of one or two species in all the different transformations from the larva to the imago, with, in many cases, the egg, and invariably the food-plant of the larva; all the figures drawn from Nature by Mrs. E. Wilson.

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EDITORIAL.

EARLY in the present year we were favoured by various correspondents with kindly suggestions as to the future of the 'Entomologist.' As might perhaps be expected, these suggestions were very diverse, and, anxious as we were to meet the wishes of our correspondents, we found such a course impracticable, seeing that they belonged to one or other of the following classes of specialists:—

- a. Those who are chiefly interested in the formation of a collection of insects, and who desire a restriction of the space allotted to matters pertaining to the study of Entomology, and an extension of that allotted to field work and exchange.
- b. Those who are chiefly concerned in the biology of insects, and do not regard with any favour the accounts of work done by collectors in various districts.
- c. Those who are interested in the insect fauna of Britain alone, and cannot appreciate, or even tolerate, papers on insects from regions which they consider outside their sphere.

An attempt to satisfy either of these would only have resulted in strained relations with the other two; and, besides, we did not deem it desirable to narrow down the scope of the 'Entomologist' to the requirements of a class, even if we could have supposed that there were many among our readers as exclusive as some of our correspondents seemed to be. In

conducting this Journal, the primary object we have in view is to make it widely and generally useful. We have every reason to believe that our readers are, as a whole, well disposed towards us, as also to each other, and desire to assist, "by mutual confidence and mutual aid," in the attainment of our purpose.

The suggestions of our readers will always receive due consideration; but we would point out to those who do not wish the publication of such papers as those on the insect fauna of China, that others are interested; that they are a valuable contribution to scientific knowledge; and that they do not interfere with the space devoted to British or non-descriptive Entomology, as additional pages are always given when such papers are published.

It would seem almost unnecessary to say that we highly value, and now again ask our readers for, notes on British Entomology, records of captures, &c. An analysis of the contents of the present volume will show that, as regards this class of matter, the volume for 1890 is equal to its immediate predecessors, and distinctly in advance of all the others.

We are glad to say that the 'Entomologist' has already an increased circulation abroad, and that it still maintains the position it has so long held in this country. These facts, taken together, should make it apparent that as a medium for the interchange of views and opinions on entomological matters the Journal has gained in value. It may not, perhaps, be of direct importance to some of our contributors whether their papers or notes are read or not by entomologists abroad, but indirectly it does concern them, because the larger the circulation of the 'Entomologist' so much greater will be the surplus to expend on plates and extra pages.

The present volume contains 400 pp. and 4 plates. That for 1889, 320 pp., 8 plates, and 1 portrait; for 1888, 336 pp. and 1 plate; for 1887, 344 pp. and 2 plates. The number of plates in 1889 was in excess of that for this year; but it is, perhaps, not generally known that the cost of the four plain plates and half that of one coloured one was defrayed by the authors of the papers which they illustrated.

NOTES ON THE RHOPALOCERA OF WEST NORFOLK.

By A. SMITH.

OF this division of the Lepidoptera, sixty species are given as having occurred from time to time within the area of the Fens. The present notes merely refer to this immediate neighbourhood, say within the confines of a day's walk. Many other species are said to be found at a distance of a mile or two; but three or four years of close observation has produced only the limited number of sixteen species. I may add that a drive to such places as Wisbeach, March, Manea, Upwell, through Bardolph Fen to Lynn, or prolonged walks in various directions, has not afforded any additional species to those found at home. I can walk along one ditch alone and find eleven of the number in one day in August, and during that month the lot could be seen there, with one exception, the orange-tip. The district is poor as regards species. Agriculture, with its consequent drainage improvements, has deprived the fens of some grand old species, while the advantages of cultivation have only favoured such common ones as the whites, small tortoiseshell, and the like. The present notice chiefly refers to the last three seasons. The lateness of appearance of the perfect insect, in most instances, may be accounted for by the flatness of the district, the prevalence of east winds, and the backwardness of vegetation.

Pieris brassicæ.—The remark sometimes applied to this species, that it outnumbers nearly all our native butterflies, does not apply to this locality, for, in reality, it is numerically deficient when compared with *P. rapæ*, and sometimes, as was evident this season, with *P. napi*. The fly is fairly abundant during the latter half of May and throughout June; with the advent of July it falls off rapidly, abounding again when August is reached, being the most profuse in that month, and on to the first week in September, when the species begins to fail. Larvæ numerous on cabbage; have seen them feeding down to the first week in November.

1888: May 21st—September 19th. 1889: May 8th—September 17th. 1890: May 7th—September 19th.

P. rapæ.—This is really the domestic butterfly, as regards abundance in this restricted spot. It far exceeds the last, beginning its career occasionally in April, becoming very numerous in May and June; a slackness during the first ten days of July is succeeded by great numbers from that time onwards. During August the gardens, pastures, and more especially the clover fields, are alive with the whites, of which this species is by far the greatest contributor. In September it is also plentiful, appearing less after about the third or fourth week. I have

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ced fine specimens of this insect with the under surface of wings a beautiful yellow. Larvæ feeding upon their usual food as late as the frosty mornings of November.

1888: May 21st—September 26th. 1889: April 27th—September 27th. 1890: April 5th—October 14th.

P. napi.—Another common butterfly, more so perhaps than each other, owing to their being placed in the same category, viz., the middle-sized whites; and for this cause I do not deal with this insect with the same amount of certainty as with all the rest; the experience of the past season has confirmed my opinion that I have hitherto under-estimated this fly as regards individuals. The greatest plenty, it has been noticed, was in May, 1889, on a piece of marsh land, where *Cardamine pratensis* was in flower and very plentiful. The insect was fluttering about in all directions, leaning most to a damp spot of several acres in extent, which was alive with them. This profusion of any one species in a given locality has only once been exceeded in my experience, which was an August brood of the wall-butterfly. The present species starts its season in April, but it is not till May is fairly in that it is seen in average numbers. During June it does not occur as common as the two preceding species of *Pieris*; from the middle of June and through August it is plentiful enough, resorting now more to cultivated tracts, scarcely occurring at all on the above-mentioned marshland. In September this fly apparently fails about the third week. Some of the individuals met with are very small. Caterpillar is said to feed upon rape (*Brassica napus*). Personally I have never found it on that plant, but have seen large batches of them faring upon "kohl rabi" (*B. oleracea caulorapa*); it doubtless also feeds on ordinary garden greens.

1888: May 22nd—October 9th. 1889: May 4th—September 29th. 1890: April 28th—October 9th.

Euchloë cardamines (*Anthocharis cardamines*).—Perhaps of all our butterflies this has the most characteristic name, at least as regards the male. This flying flower is the pretty insect that comes careering across the croquet lawn on a fine June afternoon, seldom failing to elicit a remark from our non-entomological players; but it may be safe to say the lady insect loses the honour conferred upon her more attractive partner. This fly is generally considered to be abroad in April, but here in our bleak district it does not occur till May, and not before the middle of the third week. After once out, however, it is to be seen almost daily for the remainder of the month to about the middle of June, after which it falls off rapidly. Was most abundant in June, 1888; and on June 26th, 1889, I noticed a solitary male at Manea in Cambridgeshire. I have noticed no variation in the orange patch, neither met with the species in the

1888: May 24th—June 28th. 1889: May 23rd—June 26th.
1890: May 21st—June 18th.

Pararge megæra (*Lasiommata megæra*).—By far the most uniform in its appearance of any of the double-brooded species, and also the one that can claim to have occurred in the greatest profusion. A fen drove, with a drain one side and a ditch on the other, about a mile long, sheltered on both sides by standing corn-fields, was the scene of the August brood of this butterfly, in the dry season of 1887, which literally swarmed there. Like the green-veined white, they vary much in wing area, more so than any other species on my list; in fact some specimens did not much exceed a small copper-butterfly, and I noticed these were much darker in colour than the finer ones, or perhaps it would be safer to say that in the larger individuals the fulvous ground covers proportionately more space. The insect usually appears about May 24th, but the brood is limited, lasting only twenty-four days; and I have not known it to endure to July, neither the second to begin in that month. This second is by far the most extensive, being met with in plenty daily through August, continuing to September, gapping considerably from the middle of the month. This warmth-loving species is the most subject of any I know to the loss of a secondary wing, which, by-the-bye, seems to occasion but little inconvenience. Perhaps this insect is an article of diet with the voracious Neuroptera, as I once observed a dragonfly seize one, beginning at the head and eating downwards, the wings falling off on their respective sides; the creature did not eat the wings. This was one of the neatest mechanical operations I ever witnessed. Unobserved in preliminary stages.

1888: June 2nd—26th; August 20th—September 30th.
1889: May 23rd—June 14th; August 1st—September 23rd.
1890: May 21st—June 16th; August 5th—September 19th.

Epinephele ianira (*Hipparchia ianira*).—Although a common and sober-coloured insect, this is still an interesting butterfly, appearing, as is its wont, about hay-time, showing to best advantage when freshly emerged, traversing the meadow eddish, or, better still, the pastures, which by this time have generally assumed a sun-scorched appearance; indeed, if it were not for this and the next species, many a tract of parched turf would be deprived of much of its life. It has also the additional habit of remaining on the wing during the dull portions of the day, as in the warmth of sunshine. What the butterfly teaches in the general term, this one carries out specifically: in this flying mirror we may see the importance of a cheerful spirit. The butterfly is abundant during July and August, decreasing, however, towards the close of that month. Two seasons I have noticed a single example in September. Unobserved in preliminary stages.

1888: July 8th—September 1st. 1889: June 26th—September 9th. 1890: June 23rd—August 25th.

E. tithonus (*H. tithonus*).—Sometimes called the small meadow-brown; and to some extent this twin-spotted species is a small edition of the last. I should estimate that it is not much more than a third so abundant as its larger congener. The flight is slow, and in its habits it seems to be much more sedentary; it is also on the wing for a shorter period. During 1888 only a few pairs were seen. In the present season it has been much more abundant. I noticed a batch of about eight individuals sporting about one plant. This also is the only year it has endured to September. Not seen in preliminary stages.

1888: July 20th—August 27th. 1889: July 8th—August 16th. 1890: July 16th—September 6th.

E. hyperanthes (*H. hyperanthus*).—Nature seems to have availed herself of this species to enforce the rule that in her whole realm there is no monotony, and has, so to speak, turned this butterfly up side down; and this fact may, or may not, have first suggested the idea to collectors of setting their specimens horizontally to show the under surface. This insect agrees in the main with the two last, but it is not such a plain-loving species, seeming to prefer more shade. I have been curious to notice that it flies deeper in the ditch than any other species, threading its way among the tangled vegetation, and often being seen to settle. Have noticed no variation in the characteristic ringlet-spots. The butterfly, a rather feeble flier, is on the wing but a very short period, and was most abundant in 1890. Unobserved in preliminary stages.

1888: July 13th—August 10th. 1889: July 6th—25th. 1890: July 10th—August 5th.

Cænonympha pamphilus.—This little butterfly is usually met with on grass-land, and seems to be a ground-loving species. It is never met with in quantity; singly or a pair is the most I have observed. This may be due to their small size, the tawny colour blending more or less with the drier grasses; therefore the insect is less conspicuous than the little blue or small copper butterflies. I have watched a pair sporting on a grassy bank only a few yards distant, yet were frequently lost to view among the herbage. The insect was most abundant in 1889 during June. May occasionally be seen in August, never lingering till September. For some cause I have not seen a specimen in 1890, this being the only absentee; about the time of its appearance the weather was excessively wet. Unobserved in preliminary stages.

1888: June 11th—July 10th. 1889: June 5th—August 31st.

Vanessa cardui (*Cynthia cardui*).—This butterfly appears to be a perfect cosmopolite, and is the most capricious of all, being fairly plentiful one season, and perhaps absent the next. In 1888 it was fairly common in the latter part of August and September; while in 1889 it was most abundant of all, being observable almost daily for a time in August, diminishing rather suddenly at the

close of that month. The only specimen observed in 1890 was on August 7th, one of the few warm days of the summer up to that date. Years preceding 1888 this insect did not appear at all. Hybernators are to be seen chiefly in June; I noticed one specimen as late as July 24th, 1890. Never seen in preliminary stage.

1888: August 9th—September 27th. 1889: August 6th—September 12th. 1890: August 7th.

V. atalanta.—While dealing with the genus *Vanessa*, two things strike the observer: first, that it suffers least when compared with its exotic congeners of warmer climes; and the second, that such handsome species should be so easily obtained. As nettles do not thrive so well apart from cultivation, this again tends to make the species the more familiar. This handsome species is, perhaps, the most gorgeous of all the British butterflies, being most bold and fearless in its habits. I once carried a specimen, that chose to locate itself on my arm, a distance of some fifty yards and into the house. The butterfly never appears till August; and even in this last late season I did not notice it in October. As autumn is the perfection of the farmer's year, so the red admiral, painted lady, peacock, &c., crown the butterfly season. Have never observed a hybernator of this species, nor discovered the larva.

1888: August 29th—September 19th. 1889: August 16th—September 10th. 1890: September 28th.

V. io.—Like the orange-tip, this species introduces itself to the observer, and is very common in the fens, being much more abundant in some seasons than others. In 1887 I reared a hat-box full of larvæ, turning off a hundred of this species and twenty-eight of the small tortoiseshell; but this bore no effect upon the succeeding wet season of 1888, when it was rather scarce and late. Since 1887 it was most numerous in 1889. The perfect fly is never seen till August, but lingers with us till late in the autumn, the specimens occurring at this time being often much bleached, and I always consider it a brittle species. Hybernators plentiful in the spring, abroad as early as April 4th.

1888: August 31st—October 2nd. 1889: August 5th—November 8th. 1890: August 7th—October 10th.

V. urticae.—By far the most abundant of the genus, abounding everywhere on pastures, waste corners, &c., where nettles most abound. In three years I have only seen the butterfly out once in June. Half of July is gone before it is general; from that time it is common enough, generally out-lingering the other species, being often the only one to cheer the month of October. I have noticed some fine specimens of this insect, but the large tortoiseshell has never turned up. Was most abundant in 1890. Hybernators are out as early as March 17th. Patches of nettles are sometimes black with the larvæ of this and the peacock

1888: July 17th—October 18th. 1889: June 28th—October 21st. 1890: July 14th—November 5th.

Polyommatus phlœas (*Chrysophanus phlœas*).—Of the three species of this genus allotted to Britain, this is the only one we can practically claim; for the purple-edged copper (*P. chryseis*) can only be considered as a visitor, perhaps the only plausible occurrence being that of Ashdown Forest, Sussex; while yet another, the scarce copper (*P. virgaurea*), is said to have been taken in the marshes of the Isle of Ely, and in Huntingdonshire. The large copper (*P. dispar*) used to swarm in the fens of Huntingdonshire and Cambridgeshire; the metropolis of the insect was apparently the vicinity of Whittlesea Mere; while a specimen is recorded from Bardolph Fen. Probably this was a border limit for the insect, as it is within a short distance of the higher ground, and possibly the only locality within our county. Bearing this in mind, I always give the water-dock a hawk's-eye view, when happening to meet with it. Although considered specifically distinct from the continental *P. hippothœ* by the older authors, I suppose now it is only considered to be a variety of that species, and its extinction in Britain favours this latter view, as I do not believe in the so easy extinction of a species, properly so called, and that confined to one spot of one island of a Continent. That it should exceed in size and vary in its markings is not conclusive evidence, seeing that the whole order is so much subject to variation; there always seems to be an accommodating process going on in nature, and this fen locality may have especially suited the development of this butterfly, as it does to-day a certain breed of farm stock. Our present little species is a lively insect, flashing about in much the same fashion as the blues, but is not quite so exploratory perhaps; the flights seem to be shorter and more rushing, as if to some destined spot. I have noticed that this and the blue often rest on the same flower-head, while this species would drive a larger insect than itself away. I have only once come across the insect in June, skipping about in the midst of a pasture, where sorrel was very plentiful, at just about the same height and manner as related of the small heath. The last batch is more often seen in the ditches, where a greater variety of wild flowers abound. This butterfly was most abundant in 1890, after the fine weather set in, lasting well into September. Unobserved in preliminary stages.

1888: June 14th. 1889: August 30th—September 11th. 1890: August 23rd—September 23rd.

Lycæna icarus (*Polyommatus alexis*).—The only blue yet observed, and it is natural that it should be a species that is not fastidious as regards soil. Notwithstanding the rich tiling of many species, perhaps this catches the observer's eye as well as any. Assuming this is my only blue, it may be seen as far distant as any, the colours blue and green naturally contrasting

so well, so naturally is the colour of the upper regions reflected in this butterfly. It may be seen on the wing in June, but the latter brood is the more abundant, usually occurring most in August, continuing into fine Septembers. I saw more of it in 1887 than in the last three seasons together. Unobserved in preliminary stages.

1888: June 21st—28th. 1889: August 30th—September 14th. 1890: June 2nd—September 15th.

Hesperia sylvanus (*Pamphila sylvanus*).—Like the last, the only representative of its tribe. This butterfly occurs regularly in June, being often seen in a certain spot. Contrary to most species, it is far more plentiful in the first than in the second emergence, being most frequent during June. The flights of this insect are short, the so-called skipping very rapid during bright sunshine, in duller weather less active. One dull morning, after rain had fallen, I caught a specimen with the finger and thumb, as it was settled upon a reed. This insect does not linger at all late in the season; I have not known it to extend to September. Unobserved in preliminary stages.

1888: June 16th—August 21st. 1889: June 22nd—August 1st. 1890: June 16th—July 24th.

Nordelph, Downham Market, Norfolk, Nov. 5, 1890.

COLLECTING IN WALES.

By J. ARKLE.

FOR those who are high-minded let me prescribe much riding on Welsh railways. Whether you shoot along the stone heaps beyond Bala, or touch the edge of the sea-cliffs at Barmouth, or screw round a mountain on the "narrow guage," the moral is the same—you are as helpless, and, let us hope, as humble, as the two-year-old who possibly shares with you the compartment. There is nothing to be seen out of window to make you rise in your own estimation. You are immediately shot across a gaping glen or rocky chasm, and the sight of a foxglove, with its possible *Eupithecia pulchellata*, only intensifies the idea that you are done with all things sublunary. And yet accidents are just as rare as on other lines, nor are the insurance rates higher. With such philosophies the time went by until the sight of a smart groom and turn-out, at Maentwrog, suggested I might change the scene, and recollect that the business on hand was moths and not morals. Away and along the highway we rolled, and, after picking up my host, Mr. W. J. Kerr, who pointed to the scorched-looking oaks nearly defoliated by swarms of *Tortrix viridana*, the evening of July 14th found me once more among the leafy shades of Tan-y-Bwlch (*Under the Hill*), and by the waters of Glan

William. The weather, which had marked the whole of the summer, was about as wet and cold as a summer could be, but we began without loss of time our raid upon the insects. The evening was so wet that we confined our operations to the garden, where we found *Apamea basilinea*, *A. oclea*, *Metrocampa margaritaria*, *Abraxas grossulariata*, *Campptogramma bilineata*, *Hypena proboscidalis*, and *Zanclognatha grisealis (nemoralis)*.

July 15th.—A fine, warm, sunny day, and we made the most of it. Merionethshire is a land of fritillaries, but, as everyone knows, these butterflies have their haunts. It was too early in the season for *Argynnis paphia*, but, in an opening in the wood among the Plas grounds, and near the lake, we netted *A. selene* (worn) and *A. adippe*, also *Epinephele ianira*, and, by beating, *Melanthia ocellata*. A fine dark brown dragonfly, with yellow spots and stripes (*Æschia pratensis*), was also taken, but unfortunately the colours of this insect are not permanent, and soon fade after setting. The afternoon was spent on the heath-, fern-, birch-, and oak-covered slopes, which border the ascent to the celebrated Black Falls. All along *A. aglaia* and *A. adippe*—apparently fresh from the chrysalis—were common; we took a number of each species. *Anaitis plagiata* often rose from the heathery banks, and beating about among the tall ferns produced *Angerona prunaria*. *E. ianira*, a sort of robin redbreast among butterflies,—for few care to molest it,—was a frequent visitor, and pursued its meditative flight undisturbed. A fine dragonfly, *Libellula cærulescens*, rose from the bank, and was promptly stopped. The following is a description:—Head and thorax dark brown, with the usual couple of yellow frontal stripes, and couple of dorsal yellow spots, colours not permanent; body ample, plum-coloured blue, colours permanent, length $1\frac{1}{2}$ in., segments with black divisions; wings transparent, nervures black, expanse $2\frac{1}{2}$ inches. I see from my notes that the afternoon list ends with *C. bilineata*, and that its profusion was fearful and wonderful. Evening found us on the Festiniog road watching the honey-suckle bloom on the hedges for a late *Chærocampa porcellus* or *C. elpenor*. We were unsuccessful, although this is a favourite haunt for both insects. Our captures were *Uropteryx sambucaria*, *Rumia luteolata (cratægata)*, *Boarmia repandata* (exceptionally large and light-coloured), *Acidalia aversata*, *Abraxas grossulariata*, *Hypsipetes sordidata (elutata, variable as usual)*, *Cidaria populata*, *Eubolia limitata (mensuraria)*, *Phalera bucephala*, *Noctua plecta*, *Triphæna pronuba*, *Aplecta nebulosa* (all very light forms), *Cucullia umbratica* (common), *Plusia iota*, *Caradrina cubicularis*, and *Aphomia colonella*.

July 16th.—A fine morning, spent in setting. We started in the afternoon for the Black Falls, taking on our way *Dictyopteryx bergmanniana* and *Coccyx ustomaculana*. A deluge of rain compelled us to return home, where we arrived wet through. Th

evening was a damp one; but we turned out, and netted *Cabera pusaria*, *M. margaritaria*, *Thyatira batis*, *Hydræcia nictitans*, *Agrotis exclamationis*, *Bromolocha fontis* (*crassalis*), and *Hypena proboscidalis*. At sugar we had poor luck, meeting only our old friends *Xylophasia monoglypha* (*polyodon*), *T. pronuba*, *A. exclamationis*, *T. batis*, and *Cidaria truncata* (*russata*). I boxed a female glow-worm, *Lampyris noctiluca*, as it brilliantly lit up an inch of grass in the wood.

July 17th.—A fine, warm, but sunless day. Mr. Kerr and I drove to Penrhyndeudraeth, a distance of eight miles. The nearest approach I can make to this formidable word is Pen-rin-dreth. Like other Welsh names it is singularly descriptive, and means *the headland between the two estuaries*. There we started by train for a week's collecting at Aberdovey, a little town of a thousand inhabitants, half-way along the shores of Cardigan Bay, and, as the name implies, at the mouth of the Dovey. Parallel with the north shore of the estuary, and running away east and behind the town, is a range of heights some 300 feet above the sea-level. In the neighbourhood of the town these hills are covered with grass, furze, and fern, and are said to be a locality for *Lycæna arion*. As the heights run inland they are covered with a luxuriant growth of native oak, and midway between Aberdovey and Glandovey Junction they descend, within a few hundred yards of the estuary, in woody valleys meeting round a common centre. Here lies some of the finest scenery imaginable, and here lay our best butterfly ground. We reached Aberdovey, *viâ* Barmouth, at noon, and operations began at once by the discovery of *Dianthæcia* larvæ in the seed-pods of bladder campion growing about the railway-station. These caterpillars we made out to be *D. carpophaga* and *D. capsophila*. They pupated after I returned to Chester, before the end of the month. After lunch at the Dovey Hotel we turned out to secure quarters, and noticed on our way specimens of *Bryophila perla* at rest upon the walls. Our first attempt at securing lodgings was a failure, owing to the landlady taking alarm at our demand to be out at all hours of the night. This, coupled with a statement that our business was "moths," brought upon us expulsion. However, at No. 1, Bodfor Terrace, we triumphed in the surrender of a latch-key, and there we spent as happy, as homely, and as comfortable a week as could fall to the lot of humanity. The list for the afternoon is as follows:—Larvæ of *Bombyx rubi*; *C. umbratica* at rest; by beating brambles, St. John's wort, &c., *Hemithea strigata* (*thymiaria*), *Emmelesia decolorata*, *Eupithecia subfulvata* var. *oxydata*, *E. linariata*, *E. exigua*, *E. pumilata* (plentiful), *Mimæseophilus plagiodyctylus*, *M. ocellata*, *Acidalia bisetata*, *A. marginepunctata* (*promutata*), *Cidaria pyralia*, *Pelurga comitata*, and *Scoparia mercurialis*.

A bottle of rum, a lantern, a treacle-pot and a blacking b

are not common ornaments to a sea-side costume, and our hostess viewed these auxiliaries in the art of fascination with some curiosity. Every evening we sallied forth with these additions to our personal appearance. We had two sugaring grounds, and they had the advantage of being near at hand. No. 1 began at the large white hotel, a few hundred yards away on the road to the railway-station, and occupied some years ago by a religious community, but since untenanted. The deep silent doorways of this lonely building were convenient shelters in the rain, until we were informed we were upon forbidden ground. Every succeeding night a sentry was placed upon the premises, and the occasional step we heard through the darkness showed—as they harmoniously sing in ‘The Yeoman of the Guard’—“He kept his solemn watch and ward.” From this hotel, along the road at the base of the hills, we sugared everything,—gates, posts, rocks and plants. Our second ground was the sand-hills, only a couple of hundred yards off, and near the sea. Here a line of posts in the fence beyond the railway provided every accommodation for the treacle. The sand-hills are not equal to those of Wallasey. A suspicious-looking mark looks as if much of the ground lay under water in the spring tides. Still there is plenty of vegetation,—the trefoils, the bedstraws, mullein, fennel, and maritime grass. Farther away, a marsh lies between the sand-hills and the road, with any amount of water-dock, sedge, and willow. Flowers there were, and fit to adorn any garden:—the viper’s bugloss, with its host of purple and pink blossoms; the sea thistle, with its prickly, pale, pea-green leaves and sky-blue flower-balls; and groves of the tall evening primrose, with its large yellow blooms open to the night. We tried the latter at dusk to see if *Deilephila galii* would turn up, but we only netted *X. monoglypha* and *Miana bicoloria* (*furuncula*). The night was warm, dark, and threatening for rain. It was now time to examine the sugar, and we found moths in swarms at it. I never saw anything to equal our success. *X. monoglypha*, in hundreds, showed several beautiful varieties,—the finest, a very light-coloured example, with markings almost black, being now in the collection of Mr. Kerr. The next insect in point of numbers was *Hadena oleracea*, and it was equally conspicuous for variation. *Triphæna pronuba*, *T. orbona*, *Leucania lithargyria*, *L. conigera*, *X. lithoxylea*, came next. We also took several specimens of *Mamestra albicolon* and *M. persicariæ*, *Caradrina blanda*, *Nonagria fulva*, and light and dark varieties of *Agrotis segetum*. The following are our additional lists at sugar:—

July 18th.—Warm, wet day, with night showers. *Thyatira derasa*, *Cerigo matura* (*cytherea*), *M. bicoloria* (*furuncula*), *Agrotis lunigera*, *A. corticea*; *X. monoglypha* and *H. oleracea* (nuisances); *L. conigera* (fine varieties), *L. lithargyria*, *L. pallens*, *Noctua*

plecta, *Hydroecia nictitans* (all sorts of varieties from the lightest to darkest), *T. orbona* and *T. pronuba*.

July 19th.—Warm, moist. *Acronycta rumicis* (plentiful, beautiful varieties), *Mamestra abjecta*, *Noctua baia*, *N. festiva*, *Hadena contigua* (common), *H. pisi*, *H. adusta*, *A. lunigera* (common), *T. derasa*, *C. matura* (*cytherea*, common), *M. bicoloria* (*furuncula*), *Apamea basilinea*, *Caradrina quadripunctata* (*cubicularis*), and, at light, *Plusia chrysitis*.

July 20th.—Still warm and damp. A similar list, with the addition of *T. interjecta*. Netted *Nudaria mundana*, *C. fulvata*, *Aphomia sociella* (*colonella*), and *Hyponomeuta padellus*. We frequently saw *T. interjecta* at dusk, and as frequently missed it, owing to its partiality for bramble protection. Its russet colour was unmistakable. *C. bilineata*, as usual, added very materially to our netting exertions.

July 21st.—Dry, temperature lower. *Botys ruralis* (*verticalis*), *L. conigera*, *L. littoralis*, *A. lunigera*, *C. matura* (*cytherea*), *Euplexia lucipara*, *H. contigua*, *H. trifolii* (*chenopodii*, worn), and *H. nictitans*.

July 22nd.—Blew half a gale from the N.W. Dry, much colder. *X. monoglypha* only by the dozen; a few *X. lithoxylea*, *H. nictitans*, *A. exclamationis*, four specimens of *C. matura* (*cytherea*), one *M. albicolon*, one *M. literosa*, and a few *L. lithargyria* and *L. pallens*.

July 24th.—A cold, dry evening. Poor results. A few *X. monoglypha*, *X. lithoxylea*, *T. pronuba*, *T. ianthina*, *H. pisi*, *H. oleracea*, and *H. nictitans*. The last-mentioned was always very variable. The following are our diurnal records:—

July 18th.—A wet day, devoted to setting.

July 19th.—Warm and sunny. Went to the oak woods on the heights between Aberdovey and Glandovey Junction. On our right we had the sea, or rather estuary; on our left, wooded slopes, with occasional clearings green with fern or purple with blossoming heather, bosky dells, and shady delicious streams. Netted *A. selene* (worn), *A. aglaia*, *A. adippe*, and *A. paphia* (the three last abundant). *A. paphia* was evidently in quest of partners for its brief joys. Its flight was swift and vigorous, and rarely interrupted by bramble or other blossoms. Its capture was consequently warm work. *Satyrus semele*, *E. ianira*, *E. tithonus*, *E. hyperanthes*, *Cænonympha pamphilus*, *Polyommatus phlœas*, *Hesperia sylvanus*, and *Lycena icarus* (*alexis*) were also common. Saw several suspicious-looking "blues," but failed to net them owing to the difficult ground. Other butterflies:—*Pieris brassicæ*, *P. rapæ* and *P. napi*. Two yellow beetles with black markings were captured,—*Strangalia armata*. We also took *Calopteryx virgo*, a dragonfly with head, thorax, and body bright iridescent green; wings deep iridescent peacock-blue; tips of wings smoky, but transparent; colours permanent; expause

wings $2\frac{1}{4}$ inches; length of body $1\frac{3}{4}$ inches. On our return, the heath on the hill-sides produced *Zygæna filipendulæ*, *Pyrausta ostrinalis*, and the rose-coloured *Endotricha flammealis*—all abundant insects. As usual, and throughout our stay, we took *A. promutata* (at rest on the rocks) and the *Eupitheciæ* already quoted.

July 20th.—Fine; neighbourhood close to Aberdovey. Additional insects:—*Lomaspilis marginata*, *Schænobius forficellus*, *Crambus perlellus*.

July 21st.—Warm, sunny at intervals. Locality as on the 19th. Additional insects:—*Sesia bembeciformis*, a fine specimen taken from the tops of willow; *Bombyx quercus*; *Panagra petraria*, from a bog close to Glandovey Junction, and amongst a herd of long-horned cattle (this exhibition was a gratis one to a trainful of people bound for Aberystwith). Larvæ of *Arctia menthastri*, just hatched, were also taken from a willow-leaf almost at the top of a bush. On the railway-embankment tangled masses of the wild everlasting pea, with its familiar pink blossoms, grew luxuriantly.

July 22nd.—Went inland across the hills behind Aberdovey, and doubled round to the road home. On the plateau, about 300 feet above the sea, we came upon a large area with a profuse growth of big wild pansies amongst the short grass. There were two varieties, violet and yellow, and an obvious cross with the upper petals violet and the lower ones yellow. Additional insects:—*Vanessa urticæ*, *B. gemmaria* (*rhomboidaria*), *Pseudoterpna pruinata* (*cytisaria*), *A. aversata* var. *lividata*, *Larentia viridaria* (*pectinitaria*), *Tanagra atrata* (*cherophyllata*), *Crambus culmellus*, and the brown *Aspis udmanniana*, with its staring chocolate spot on each upper wing. We also captured a dragon-fly. The latter insect is of a uniform but iridescent brown, with a pale costal spot near the tip of each wing. The head, thorax, and body, however, show indications of the glorious tints which adorn *Calopteryx virgo*, and its identity is still further apparent in matters relative to size and shape.

July 23rd.—A cold, sunless day, with a breeze from the N.W. Additional insects:—*Liparis similis* (*auriflua*) and *Cabera exanthemaria*.

July 24th.—A fine day. We counted five or six varieties of wild geranium, including the rare deep pink *G. sanguineum*, close to Aberdovey. Returned to Tan-y-Bwlch: here we found that *A. paphia*, *Thecla quercus* and *Larentia olivata*—all abundant insects in their season—were so late as to be not even yet on the wing. Sugared in the evening. Our Aberdovey experience showed that the cool dry night was the cause of a poor result.

Next day, July 25th, I determined to have a look at Abersoch, a few miles by coach from Pwllheli, and on the north shores of Cardigan Bay. It will be remembered (see 'Entomologist' for

August, 1887, and August, 1889) that—thanks to Messrs. L. L. Samuels and C. Oldham—*Zygæna pilosellæ* (minos) turned up at Abersoch in the years above mentioned. Although the insect appears to be due in the second week of June, I decided that a visit might result in the capture of a late specimen, or in the establishment of such relations with the neighbourhood as would enable me to secure a series of this rare and beautiful moth. Amidst much regret that I could not have the company of my kind host, I was driven again to Penrhyndeudraeth, and from thence by train to Pwllheli. I was surprised to find Pwllheli—figuratively speaking at the end of the world—such a smart-looking town. There are good hotels,—one I can answer for, 'The Crown,' and from this hostelry a trap runs in connection with the morning train to Abersoch. The regular conveyance had been requisitioned by a lot of school children for a day's outing; but, in lieu of this, I was introduced to a Welsh car. This is a low, circular vehicle, on four wheels, with a chair-like seat high up in front for the driver. The turn-out included a big, spanking horse, and conjured up, in due chronological order, visions of Jehu, the war-chariot of the ancient Britons, and the modern reaping-machine. Wishing the youngsters a pleasant day, away we went in bright sunshine, and I whiled away the time by eyeing the long rows of willows on each side of the road—an occupation ever and anon interrupted by the jerks and efforts of our quadruped to shoot me out at the rear of the trap. On reaching Abersoch I was speedily on "the sunny slopes above the cliffs," but only to find that I was three or four weeks too late for my insect. *V. urticæ*, *S. semele*, *E. ianira*, *E. tithonus*, *C. pamphilus*, *L. icarus* (alexis), *Z. filipendulæ*, and *P. petrarria* were abundant. Sticking to the bents of the maritime grass, and close to the sea, were thousands of the pretty spiral land shell, *Bulimus acutus*. At our hotel I was shown what had been a fine specimen of *Acherontia atropos*. It flew in through the open window; and I was informed the moth was not at all unusual,—a matter perhaps explained by the numerous potato patches on the hill-sides. I did not leave the village until I had every reason to hope for a series of *Z. pilosellæ* from the cliffs next season. I got back to Pwllheli (*Pool-tell-he* will do for an Englishman) wet through; but as I had long since graduated—taking the degree *Amphibious*—the matter was a small one. I reached Tan-y-Bwlch in the evening, and a chat over the events of the day brought to a close our long and enjoyable insect raid.

Chester, October, 1890.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF
MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

DURING the past few years Mr. F. G. Fenn has had in hand the preparation of a list of the insects of Isleworth, and now that he has removed to London he has kindly given me permission to prepare his records for publication. While doing so, it seemed advantageous to gather together various unpublished records of Middlesex insects which I had in hand, and to publish the whole as a contribution to the fauna of the county. I at first intended to group the species under the localities; but it was represented to me that a systematic list, with the localities given for each species in order, would be more useful, and I have adopted this arrangement. I should have liked to make it a complete list of all the known Middlesex insects, but the labour of compilation from all the published papers on the subject is more than I can at present find time to attempt, and I am obliged to leave it only as complete as circumstances permit. I shall quote published records only when I have the species recorded in no other way, and shall only give one published record as a rule for each such species, though there may be more existing; that is to say, I shall make the list of species as complete as possible, but shall not repeat numerous already-recorded localities.

Species recorded from London will be included, as Middlesex will be understood in the old sense, thus including the greater part of London. Species recorded from "near London" and "London district" will be omitted, as these are in most cases not Middlesex records. Everything will be included, common or rare; but after this preliminary list has been completed, species additional to it will be found from time to time, and it is hoped that before long our Middlesex insect-fauna will be so complete that any addition will be regarded as of importance.

The compiler is responsible for the nomenclature adopted throughout. Myriapoda and Arachnida will be included.

As far as possible the collector of each species will be given proper credit; if the collector and recorder are not the same, the names of both will be given, as "*Jones fide Robinson.*" When only one name is given, it is always the recorder, but usually in such cases he is also the collector.

The compiler will be exceedingly indebted to any entomologists having Middlesex records, if they will send them to him to be included in the present list. Records of the less-known orders will be specially valued. The following are the chief sources of information at present available:—

(1.) F. G. Fenn. A MS. list of the insects of Isleworth, taken during the years 1887—1889. Assistance was given in identifications by the following entomologists:—Mr. W. West,

Coleoptera, 32 spp.; Mr. E. Saunders, Hymenoptera, 38 spp., and Hemiptera, 10 spp.; Mr. E. A. Fitch, Hymenoptera, 4 spp.; Mr. J. W. Tutt, Lepidoptera, 19 spp.; Mr. G. H. Verrall, Diptera, 7 spp.; Mr. E. Brunetti, Diptera, 25 spp.; Rev. O. P. Cambridge, Arachnida, 28 spp.; and a few others.

(2.) A MS. list of the insects of Bedford Park, Chiswick, taken during the years 1885—1890. By T. D. A. Cockerell, with addenda by F. G. Fenn. The following entomologists have kindly assisted with identifications:—Mr. E. Saunders, Coleoptera, 14 spp., Hymenoptera, 21 spp., and Hemiptera, 7 spp.; Mr. McLachlan, Neuroptera, 6 spp.; Mr. J. W. Tutt, Lepidoptera, 15 spp.; Mr. R. South, Lepidoptera, 3 spp.; Mr. R. H. Meade, Diptera, 15 spp.; Rev. O. P. Cambridge, Arachnida, 20 spp.; and some others.

(3.) Louis B. Prout. A MS. list of Lepidoptera, taken chiefly at Dalston.

(4.) R. South. A MS. list of Lepidoptera, taken at Mill Hill. "Taking the station on the Midland Railway as a centre, a radius of one mile will give the entire ground worked. The garden mentioned in the list belongs to J. Marshall, Esq."

(5.) F. Godwin. A MS. list of Lepidoptera of North and West London, taken during the years 1872—1875. Communicated by Mr. R. South.

(6.) F. Smith, 'Catalogue of British Hymenoptera in the Collection of the British Museum,' 1855.

(7.) 'The Entomologist,' vols. i.—xxiii.

(8.) 'The Entomologist's Monthly Magazine,' vols. i.—xxvi.

HYMENOPTERA.

Formicidæ.

Formica fusca var. *cunicularia*, Latr., Hampstead (Smith).

Lasius niger, Linn., Bedford Park (Ckll.), Isleworth (Fenn).

L. flavus, DeGeer, Bedford Park (Ckll.).

Tapinoma gracilescens, Nyl., London City (W. W. Fowler, E. M. M. 1885, p. 276).

Myrmicidæ.

Myrmica rubra var. *ruginodis*, Nyl., Isleworth (Fenn), Bedford Park (Ckll.).

Monomorium pharaonis, Linn., London (Bellevoye).

Pheidole megacephala, F., Hampstead (Smith).

Mutillidæ.

Myrmosa melanocephala, Fab., Hampstead (Smith).

Methoca ichneumonides, Latr., Hampstead Heath (Smith).

Scoliidæ.

Tiphia minuta, V. d. Lind., Hampstead Heath (Smith).

(To be continued).

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S.

(Continued from p. 343).

V.—THE CHEMICAL ASPECT (*continued*).

E.

PERHAPS before entering into details concerning yellow, which is our first pigment colour, I ought to justify an assumption that has been made from the outset concerning the changes wrought in *all* the colours experimented on,—*viz.*, that the transformation effected by my reagents is uniformly and invariably *retrogressive*; that in no instance has a progressive modification been effected,—for the apparent exception of *Melanargia galatea* has already been explained, and shown to be no exception at all. The justification of this assumption I feel to be important, since to *disprove* it were to pretty nearly demolish the entire fabric of theory and explanation that I have built upon my experimental data. And yet to say truth, when I first set myself to give a formal demonstration of this fundamental principle, I felt somewhat nonplussed. The evidence for it is so essentially of a *cumulative* character that it would be far easier simply to call attention to the assumption, and then leave it to be justified by the whole mass of experiments, and its reasonableness shown by the satisfactory results yielded by inferences drawn from it. As a matter of fact, this conception of the character of my experimental results has grown up almost irresistibly in my mind during the progress of my experiments, and has seemed to me throughout a matter of course. But it is evidently impossible that my readers, by merely reading of experiments, should evolve the same mental conviction that has gradually grown up in myself: some more formal justification must be offered to them; and I was really somewhat taken aback when it occurred to me to ask myself how I should justify to others a conviction founded on experience that is naturally *incommunicable*. At any rate, however, it behoves me to try what account can be rendered.

I think, then, that I should base my case primarily and especially on the behaviour of reds. It is universally admitted, I suppose, that red is developed through orange from yellow; the very stages almost may be seen in some species, as *Arctia caia* and *Catocala nupta*, in which species the deep red of the wing shades off into a very pale colour where it is overlapped by the fore wing. Moreover, as previously pointed out, *A. caia* and *Vanessa atalanta*, when first emerged, are often rather of an orange than a red colour, the colour deepening in a day or two. This evolution of red from yellow and orange is not confined to *insects*; everyone may easily satisfy himself by observing the

progressive colour-changes which go on as many fruits ripen, and in many leaves towards autumn, that the evolution of red from yellow is emphatically the rule. I hardly think that this will be disputed: very well then; in every experiment, without exception, in which red or pink was changed by my reagents (and red species in every group of Macro-Lepidoptera have been tested), it was invariably changed to orange and yellow, or in one or two cases to the closely allied chestnut. Here, even if we went no further, is a most substantial base from which to argue that such changes as these reagents produce are always retrogressive. But other instances may be quoted. Everyone knows that the orange of *Euchloë* is a comparatively recent development on an otherwise white species*: very well; then it is clear that, in dissolving out this colour and leaving the wing white, as it originally was, I have effected a retrogressive change. In fact, it appears to me self-evident that in all cases in which a colour has been dissolved out a retrogressive change has been effected; but I refrain from relying on this as a proof lest possibly some readers may not incline to admit so much. Next we may take such a case as *Thecla rubi*. It will undoubtedly be admitted that the green on the lower side of the hind wings has been developed as a protective resemblance to the foliage: this green is changed by every reagent to the brown colour displayed by all the rest of the wings; what better instance of a retrogressive metamorphosis? Finally, since we must assume that the uncommon and beautiful blue of Lycænidae has been developed (*why* we don't know, unless Darwin's theory of Sexual Selection be adopted) from the dull colours of primeval Lycænidae, it must be admitted that the abolition of this by the reagents is also a retrogressive change.† I hope now to have made it clear that the whole weight of the evidence—where it can be checked by admitted entomological facts—supports my assumption that these changes are in every case retrogressive. For the contrary assumption (if it should be made in any case where we have only the chemical evidence to go upon) there is *no direct evidence* from Entomology whatever, and such an assumption can only involve the whole issue in confusion and contradiction. Here, then, I quit the subject, leaving the arguments just instanced to be borne out by the general character of the results obtained by arguing upon this assumption.

In the next place it will be as well, perhaps, if I draw attention here to an important fact that concerns all the colours generally rather than any one group especially; and will therefore be

* Cf. Darwin's 'Descent of Man,' chap. 11.

† I am afraid, however, that the validity of this last argument will be denied by any who hold, with Wallace, that the bright colours of males are the originals, and the dull colours of females the derivatives. But, at any rate, the argument from red and yellow is irrefragable; and on the strength of this alone it would be legitimate, arguing from analogy, to hold that all the changes were retrogressive,—at least until any could be directly proved otherwise.

more fitly pointed out now than later, when any specific colours are being discussed. The importance of this fact to a right understanding of the experiments can hardly be over-estimated; but unfortunately it is one to whose importance I was not alive until I had been working some time. Reagents may affect pigment colours in one of two ways:—they may dissolve out the pigment, or they may simply alter it. The former action occurs with probably all chestnuts and yellows that are affected at all, and with some greens; the latter, with all reds without exception, with many greens, and with some blues. The distinction is very important, since, whilst dissolved colours can, obviously, never be restored, those *which are merely altered may, in a large number of cases at any rate, be restored, by appropriate methods, to their original appearance.** This will, I think, be acknowledged to be sufficiently startling. It was a long time before I grasped these principles in their full extent; and then it not unnaturally appeared to me that *every* colour change, when not due to dissolution, might be reversed, and the original colour so reproduced. That this is the case,

however, I find cannot be maintained, although (at least for the present) I do not wish to absolutely deny its possibility. Neither, on the other hand, would I wish to be understood as asserting that in every “reversible” colour change *no* solution of pigment takes place. On the contrary, I am inclined to think it at least very possible that in most cases a *slight* solution may take place; at any rate I do not believe that the most “reversible” colour could be altered and reversed, and so on, backwards and forwards, an indefinite number of times; certainly I believe that the colour would gradually fade away in such a case. I very much regret not being able to speak with more certainty on this matter, but, as I have already said, it was only late in the day that I discovered these facts: had I known of them earlier—known *what to observe*—it is possible that I might have found a *solution effect* produced in cases where, as a matter of fact, I have not noticed any such.

One characteristic difference I ought to add:—a solution effect *may* be produced very rapidly in some cases, but still the time element is always present; an alteration effect, whether reversible or not, is in most instances (in *all* with the fittest reagents) *instantaneous*.

F.

The two colours next to be considered—yellow and red—are by far the most interesting of all,—that is, so far as concerns these experiments: and they are so closely related, and a consideration of the behaviour of either so indispensable to a proper understanding of that of the other, that we shall do better to examine them simultaneously rather than observe the formality

* An extensive set of additional experiments on this question will be detailed in its proper place.

of giving each a separate handling: for indeed, whilst red, both logically and historically, follows yellow, yet it is impossible to fully discuss the phenomena of yellow without constant reference to red. I may add that in no group of colours is there more temptation—and even necessity—for speculation and hypothesis than in this: and in no part of my work have I had so many warnings of the dangers attendant on too speedy generalisation and the necessity for circumspection. It is fortunate that the colours which most especially tempt one to such dangers should at the same time preach the most emphatically against the rashness which they provoke.

Referring now to the tables on pp. 248, 249, what do we find as the general results? As to red (omitting the cases of one or two species, as *Vanessa atalanta* and *V. cardui*, which can be better explained after dealing with chestnut), we have a singular unanimity, as interesting as important, and can lay down the very general law* that chemical reagents *change red to yellow*; or, translating this from the language of empirical facts into that of theory,† that red is retrogressively modified into yellow—from which it was originally developed. In the species experimented upon we have every subdivision of the Macro-Lepidoptera represented, and it appears to me an exceedingly interesting fact that red is chemically always one and the same colour, however different in superficial appearance,‡ and however far apart phylogenetically be the species thus adorned: red is one and the same in the Rhopalocera, Sphinges, Bombyces, Noctuæ, and Geometræ.§

We have therefore this general result: that by the action of chemical reagents|| red is instantly changed to yellow, *but there the change stops*; and by no means can this yellow so produced be altered or affected in any way. Here we find ourselves at once face to face with the problem of the character of the yellow pigment, and to a consideration of that we must turn before we can proceed further with red.

Again referring to the table on p. 248, what do we find is the

* I omit altogether any reference to *Papilio machaon*, since the colour here—as evidenced even by its superficial appearance—is not a true red. Any significance that might be attached to this one species, as typical of the Papilionidæ, is entirely destroyed by the fact that in species of tropical Papilios sent me (e.g., *P. hector*, marked with brilliant vermilion) red is instantly changed to yellow, as in all other groups.

† See pp. 370, 371.

‡ As exemplified, e.g., by the pink of *Deiopeia* and Sphinges, the scarlet of *Parnassius apollo*, the brilliant reds of Bombyces, and the unhealthy reddish of *Xanthia*.

§ Red being so rare a colour in Geometræ, I was exceedingly anxious to ascertain whether red Geometræ would behave as all other red species; and it was with considerable interest that I examined the two species, *Hyria auroraria* and *Acidalia rubricata*, kindly sent me by several correspondents. These species will again be alluded to in another section.

|| Note that red is far more sensitive to acids than to alkalis.

general conclusion to be drawn from the experiments on yellow? Having found red always the same, wherever displayed, can we lay down an equally general law as to yellow? are all yellows one and the same? Apparently *no*! very far from it: we find, on the contrary, the most different and contradictory results, and seem almost driven to conclude that under the common name of yellow there are confused together several entirely different colours, including both true pigment colours and mere "physical" colours. But this latter assumption, as I have already pointed out,* may be considered almost completely negated by the arguments deducible from the results yielded by red; and further evidence from the comparative study of allied yellow species will be found in the present section.

[Want of space compels us to hold over the remainder of this subsection until next month.—Ed.]

(To be continued.)

Erratum.—Page 312, line 20, for "my" read "any."

LIST OF INSECTS TAKEN IN THE FAROE AND WESTMANN ISLES, AND IN ICELAND, 1890.

By F. A. WALKER, D.D., F.L.S.

COLEOPTERA.

FAROE ISLES.

THORSHAVN.—June 9th, *Nebria brevicollis*, *Calathus cisteloides*, *Patrobus hyperboreus*, *Cryptohypnus riparius*, *Tachinus rufipes*.

KLAKSVIG.—June 10th, *Nebria brevicollis*, *N. gyllenhali*, *Patrobus hyperboreus*, *Carabus catenulatus*, *Quedius fuliginosus*, *Otiorhynchus scabrosus*.

WESTMANN ISLES.

HEIMAËY.—June 12th, *Otiorhynchus monticola*, *Barynotus schonherri*, *Nebria gyllenhali*, *Calathus melanocephalus* var. *nubigena*, *Cryptohypnus riparius*, *Notiophilus bipustulatus*, *Creophilus maxillosus*, *Platysma vitreus*, *Byrrhus fasciatus*, *Amara quenselii*, *Aphodius lapponum*, *Lesteva bicolor*, *Patrobus hyperboreus*, *Otiorhynchus* ———?

REYKJAVIK.—June 13th, *Nebria gyllenhali*, *Philonthus æneus*, *Calathus melanocephalus* var. *nubigena*, *Otiorhynchus monticola*, *Amara quenselii*; June 14th, *Nebria gyllenhali*, *Barynotus schonherri*, *Calathus melanocephalus* var. *nubigena*, *Otiorhynchus monticola*, *Patrobus hyperboreus*; June 15th, *Nebria gyllenhali*, *Aphodius lapponum*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*.

ENGËY ISLAND.—June 14th, *Nebria gyllenhali*, *Cryptohypnus riparius*, *Calathus melanocephalus* var. *nubigena*, *Patrobus hyperboreus*, *Otiorhynchus monticola*.

* See pp. 310, 311.

FIRST VOYAGE ROUND ICELAND.

EAST COAST.—Berufjörðr: June 17th, *Nebria gyllenhali*, *Patrobus hyperboreus*, *Otiorhynchus monticola*, *Notiophilus bipustulatus*, *Byrrhus fasciatus*. Seyðisfjörðr: June 18th, *Nebria gyllenhali*, *Aphodius lapponum*, *Byrrhus fasciatus*, *Otiorhynchus monticola*, *Barynotus schonherri*, *Tropiphorus mercurialis*, *Patrobus hyperboreus*, *Calathus melanocephalus* var. *nubigena*, *Platysma vitreus*.

NORTH COAST.—Akureyri: June 19th, *Nebria gyllenhali*, *Platysma vitreus*, *Amara quenselii*: June 20th, *Nebria gyllenhali*, *Amara quenselii*, *Otiorhynchus monticola*, *O.* ———?, *Cryptohypnus riparius*, *Byrrhus fasciatus*, *Calathus melanocephalus* var. *nubigena*, *Chrysomela staphylea*; June 21st, *Nebria gyllenhali*, *Patrobus hyperboreus*, *Cryptohypnus riparius*, *Creophilus maxillosus*, *Amara quenselii*, *Byrrhus fasciatus*, *Calathus melanocephalus* var. *nubigena*, *Otiorhynchus monticola*, *O. scabrosus*, *O.* ———? Saudarkrok: June 22nd, *Otiorhynchus monticola*.

WEST COAST.—Ísarjardr: June 23rd, *Agabus bipustulatus*, *Bradycellus cognatus*, *Nebria gyllenhali*. Önundarfjörðr: June 23rd, *Otiorhynchus monticola*, *Nebria gyllenhali*, *Amara quenselii*. Dyrafjörðr: June 24th, *Nebria gyllenhali*. Patriksfjörðr: June 24th, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*. Stykkisholmur: June 25th, *Nebria gyllenhali*, *Patrobus hyperboreus*, *Platysma vitreus*, *Byrrhus fasciatus*, *Cryptohypnus riparius*, *Notiophilus bipustulatus*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*. Flatey Island: June 25th, *Nebria gyllenhali*, *Byrrhus fasciatus*, *Amara quenselii*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*, *Bradycellus cognatus*, *Philonthus sordidus*. Reykjavík: June 26th, *Creophilus maxillosus*, *Nebria gyllenhali*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*, *Cryptohypnus riparius*; June 28th, *Nebria gyllenhali*, *Platysma vitreus*, *Creophilus maxillosus*, *Patrobus hyperboreus*, *Amara quenselii*, *Otiorhynchus monticola*, *Barynotus schonherri*, *Calathus melanocephalus* var. *nubigena*; June 30th, *Nebria gyllenhali*, *Creophilus maxillosus*, *Patrobus hyperboreus*, *Amara quenselii*, *Otiorhynchus monticola*, *Barynotus schonherri*, *Calathus melanocephalus* var. *nubigena*; July 1st, *Nebria gyllenhali*, *Patrobus hyperboreus*, *Amara quenselii*, *Otiorhynchus monticola*, *Bembidium bipunctatum*, *Cryptohypnus riparius*, *Calathus melanocephalus* var. *nubigena*. Road to Hengill Mountain: June 27th, *Nebria gyllenhali*, *Patrobus hyperboreus*, *Calathus melanocephalus*, var. *nubigena*.

SECOND VOYAGE ROUND ICELAND.

WEST COAST.—Stykkisholmur: July 3rd, *Otiorhynchus monticola*, *Nebria gyllenhali*, *Amara quenselii*. Arnarfjörðr: July 4th, *Otiorhynchus monticola*, *Nebria gyllenhali*, *Amara quenselii*, *Cryptohypnus riparius*, *Byrrhus fasciatus*, *Calathus melanocephalus* var. *nubigena*, *Patrobus hyperboreus*. Dyrafjörðr: July 5th, *Otiorhynchus monticola*, *Nebria gyllenhali*, *Amara quenselii*.

NORTH COAST.—Siglufjörðr: July 8th, *Nebria gyllenhali*, *Cryptohypnus riparius*, *Patrobus hyperboreus*, *Amara quenselii*. Akureyri: July 9th and 10th, *Nebria gyllenhali*, *Philonthus æneus*, *Aphodius lapponum*, *Patrobus hyperboreus*, *Amara quenselii*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*. Husavík: July 11th, *Nebria*

gyllenhali, *Aphodius fætidus*, *Amara quenselii*, *Calathus melanocephalus* var. *nubigena*.

EAST COAST.—Vopnafjörðr: July 12th, *Nebria gyllenhali*, *Cryptohypnus riparius*, *Amara quenselii*, *Otiorhynchus monticola*, *Calathus melanocephalus* var. *nubigena*. Seydisfjörðr: *Nebria gyllenhali*, *Amara quenselii*, *Cryptohypnus riparius*, *Calathus melanocephalus* var. *nubigena*. Eskefjörðr: July 18th, *Amara quenselii*, *Lesteva bicolor*, *Cryptohypnus riparius*, *Nebria gyllenhali*.

FAROE ISLES.

THORSHAVN.—July 15th, *Nebria brevicollis*, *Amara spinipes*, *Calathus melanocephalus* var. *nubigena*.

The three forms of *Calathus melanocephalus* were obtained in 1890, as follows:—

WESTMANN ISLES, June 12th, typical 7, var. *nubigena*, 18. Reykjavik, June 18th, typical 2, var. *nubigena* 2; June 14th, typical 3, intermediate 1, var. *nubigena* 3; June 15th, intermediate 4. Engey Island, June 14th, intermediate 10.

FIRST VOYAGE ROUND ICELAND.—Seydisfjörðr (E. coast), June 18th, typical 3, var. *nubigena* 2, intermediate 3. Akureyri (N. coast), June 19th, typical 1, var. *nubigena* 2; June 20th, typical 4, intermediate 4, var. *nubigena* 4. Patriksfjörðr (W. coast), June 24th, typical 2, intermediate 1. Stykkisholmur (W. coast), June 24th, typical 6, intermediate 3, var. *nubigena* 5. Flatey Island (W. coast), June 25th, intermediate 2, var. *nubigena* 7. Reykjavik, June 26th, var. *nubigena* 1; June 28th, intermediate 2, var. *nubigena* 3; June 30th, typical 4, intermediate 8, var. *nubigena* 14; July 1st, intermediate 2, var. *nubigena* 2. Road to Hengill Mountain, June 27th, typical 2, intermediate 1, var. *nubigena* 5.

SECOND VOYAGE ROUND ICELAND.—Arnarfjörðr (W. coast), July 4th, intermediate 5, var. *nubigena* 1. Akureyri (N. coast), July 10th, var. *nubigena* 3. Glárafoß (N. coast), July 10th, typical 1. Husavik (N. coast), July 11th, typical 2. Vopnafjörðr (E. coast), July 12th, intermediate 1. Seydisfjörðr (E. coast), typical 3, var. *nubigena* 1.

FAROE ISLES, July 15th, typical 1, var. *nubigena* 2.

Total of specimens, 158: typical, 41; intermediate, 47; var. *nubigena*, 70.

Calathus melanocephalus, as captured in 1889:—

Thingvellir, July and August, var. *nubigena* 2. Reykjavik, July, typical 2, intermediate 3, var. *nubigena* 1. Patriksfjörðr, July, intermediate 1. Onundarfjörðr, July, var. *nubigena* 1. Saudarkrok, August, typical 1. Total 11: typical, 3; intermediate, 4; var. *nubigena*, 4.

In Staudinger's list of Iceland insects this species is termed *Calathus nubigena*, owing doubtless to the preponderance that he found there of that var., and to which he gave its name. In Pajkull's list of Iceland insects the species is termed *Carabus melanocephalus*.

DIPTERA.

Sarcophaga mortuorum: Westmann Isles, June 12th; Reykjavik, June 18th and 14th; Berufjörðr, June 17th; Seydisfjörðr, June 18th;

Akureyri, June 21st; Onundafjördr, June 23rd; Dyrafjördr, June 24th; Reykjavik, June 26th and 28th; Siglufjördr, July 8th; Akureyri, July 9th; Glárafoss, July 10th; Vopnafjördr, July 12th. *Helophilus pendulus*: Reykjavik, June 13th and 14th, 28th and 30th, July 1st and 2nd; Akureyri, July 9th and 10th. *Sericomyia lappona*: Reykjavik, July 2nd. *Scatophaga litorea*: Engey Island, June 14th. *Fucellia fucorum*: Akureyri, June 21st; Husavik, July 11th. *Platycheirus albimanus*: Seydisfjördr, June 18th. *Scatella stagnalis*: Reykjavik, July 2nd. *Chironomus tibialis*: Reykjavik, June 13th and 14th. *Scatophaga stercoraria* and *Calliphora erythrocephala*: common everywhere. *Tipula confusa*: Westmann Isles, June 12th; Reykjavik, June 13th and 14th; Berufjördr, June 17th; Seydisfjördr, June 18th; Isafjördr, June 23rd; Arnarfjördr, July 4th; Engey Island, June 14th. *T. lunata*: Thorshavn, June 9th; Reykjavik, June 13th and 14th. *T. oleracea*: Thorshavn, June 9th and July 15th.

HYMENOPTERA.

Ichneumon luctatorius: Westmann Islands, June 12th, one specimen; Reykjavik, June 13th and 30th, one; Road to Hengill Mountain, June 27th, one. *I. vaginatorius*: Akureyri, July 9th, three. *Pimpla atterrata*: Stykkisholmur, June 25th, one; Husavik, July 11th, one. *Alysia manducator*: Husavik, July 11th, ten. *Bombus terrestris*: Akureyri, July 9th, one; Glárafoss, July 10th, one.

LEPIDOPTERA-HETEROCERA.

FAROE ISLES.—Thorshavn: *Charæas graminis* (from chrysalis), June 9th; *Coremia munitata*, June 9th; *C. propugnata*, June 9th; *Crymodes exulis*, June 9th; *Aphelia osseana* (= *pratana*), July 15th.

ICELAND. — *Caradrina cubicularis*: Onundafjördr, June 23rd; *Charæas graminis*: Akureyri, July 9th and 10th. *Crymodes exulis*: Stykkisholmur, June 25th; Reykjavik, June 26th; Road to Hengill Mountain, June 27th; Siglufjördr, July 8th; Akureyri, June 20th, July 9th and 10th; Dyrefjördr, July 5th. *Noctua conflua*: Road to Hengill Mountain, June 27th; Akureyri, July 9th and 10th. *Hadena contigua*? : Road to Hengill Mountain, June 27th; Akureyri, June or July. *Coremia munitata*: Reykjavik, June 26th and 28th; Engey, June 14th; Stykkisholmur, June 25th; Siglufjördr, July 8th; Dyrefjördr, June 24th; Isafjördr, June 23rd. *Melanippe thulearia*: Reykjavik, June 13th; Dyrefjördr, June 24th; Patriksfjördr, June 24th; Stykkisholmur, June 25th. *M. biriviata*: Reykjavik, June 13th, 26th, and 28th; Onundafjördr, July 5th; Akureyri, July 9th and 10th. *Phycis fusca*: July 2nd and 5th. *Aphelia osseana* (= *pratana*): Engey, June 14th; Reykjavik, July 2nd; Dyrefjördr, July 5th; Husavik, July 11th.

From pupæ found under stones at Thorshavn, Flatey Island, Stykkisholmur, &c.:—The only specimens that emerged were *Charæas graminis* (Thorshavn), and I think it is probable that all the chrysalids were of this species.

NEUROPTERA.—PHRYGANEIDÆ.

Limnophilus griseus: Thorshavn (Faroe Isles), June 9th; Reykjavik, June 13th, 14th, 26th, 28th, and July 2nd; First voyage round

Iceland,—Seydisfjördr, June 18th; Akureyri, June 20th; Isafjördr, June 23rd; Dyrafjördr, June 24th; Second voyage round Iceland,—Dyrafjördr, July 5th; Siglufjördr, July 8th; On steamer off Orkneys, July 16th.

HEMIPTERA.

Salda littoralis, and larvæ of same, Reykjavik (June 30th, prob.); other larvæ of same species, Akureyri, prob.

ORTHOPTERA.

Forficula auricularia (N.B. The earwig abounds in the Faroe Isles, but does not occur in Iceland): Thorshavn, June 9th, all very small and immature (on flowers of *Caltha eu-palustris*, which they had gnawed nearly down to the calyx); July 15th, under stones (considerably grown in a month's interval).

ENTOMOLOGICAL NOTES, CAPTURES, &c.

DR. STAUDINGER'S COLLECTION. — There is no foundation for the rumour that Dr. Staudinger desired to dispose of his collection in consequence of failing health. We are in a position to state that at the present time the Doctor is better in health than he has been for some years past, and that he has never had any intention of disposing of his collection.

NOTES FROM CANNOCK CHASE.—I have this year found imagines to be quite up to the average in point of numbers, though I cannot say the same of larvæ. In the early spring I took *Brephos parthenias*, *Asphalia flavicornis*, *Larentia multistrigaria*, and others. Visiting the Chase again during the beginning of August, I was gratified by the sight of numbers of *Stilbia anomala*, which were flying over the heather. It has, so far as I can discover, never been taken there before. I took about 150 in all, only three of which were females, and the majority had managed to damage themselves more or less. I also took at that time *Orthosia suspecta*, *Hepialus sylvanus*, *Polia chi*, *Gortyna ochracea* (*flavago*), *Crocallis elingvaria*, *Asthenia luteata* and *Eupisteria oblitterata* (*heparata*), both getting worn, and *Geometra papilionaria*. I had to leave before *Calocampa solidaginis* emerged, but heard that it occurred abundantly. *Eupithecia nanata* and *E. minutata* occurred plentifully among the heather, and I got larvæ of *E. pulchellata* from foxglove; it had, however, entirely deserted its old haunts, though there were plenty of foxgloves. I got my larvæ from a garden on the edge of the Chase. I paid another visit in September, and devoted my energies to larvæ. From young poplar trees I got *Diceranura bifida* and *Notodonta dictæa*. I beat an immense number of birch trees with but meagre results—*Notodonta dictæoides*, *N. dromedarius*, *Lophopteryx camelina*, *Drepana lacertinaria* and *D. falcataria*, *Cymatophora duplaris* and *Asphalia flavicornis*, *Hadena adusta*, and *Geometra papilionaria* dropping into my umbrella, at long intervals, one at a time. I got about thirty larvæ of the above in all. I also got three or four *Amphidasys betularia*, usually common enough. With regard to this insect, I have found that all the larvæ from the Chase, and which are birch-feeders, produce the var. *doubledayaria*, while the lime-feeding larvæ I got in Rugeley—about $1\frac{1}{4}$ mile from the Chase—almost

invariably produce the normal form. The "Huddersfield soot theory" evidently will not do here. Possibly the nutritious value of the food has something to do with it. *Cabera pusaria* and *Phalera bucephala* were both abundant, the latter unusually so. Ragwort yielded *Eupithecia absynthiata* and *E. castigata*, and I also got *E. fraxinata*, *E. assimilata*, and *E. exigua*. One of the chief prizes of the district, viz. *Acronycta leporina*, was conspicuous by its absence, which applies also to *Panolis piniperda*, usually fairly plentiful. I heard that *Cosmia paleacea* (*fulvago*) had been turned up on the Chase this year by a Birmingham entomologist. This makes another addition to the already long list of insects to be found there. I believe it is stated that the brown form of the larva of *N. dictæa* only occurs after the last moult. I have taken a large number of these larvæ, and I find, if they are kept in a box or case, the interior of which is not well lighted, every larva, irrespective of size, will become brown, or at any rate much more brown than they originally were; irrespective of size and age, the younger individuals do not assume such a dark and well-marked brown coat as their seniors, but the yellow line on each side disappears, and the whole larva becomes a dirty yellow in colour. At the end of the season, about the beginning of October, when the poplar leaves become scanty and yellowish in colour, the larvæ rest mostly on the twigs, and even when feeding they insure their safety by retaining a hold on a twig by means of their anal claspers. These larvæ are all, or nearly all, of the brown type, and some will be found that have not undergone their last moult. These larvæ may be found full fed from the end of July to the middle of October, and this also applies to the larvæ of *N. dictæoides*. They do not seem to be double-brooded, as I have never bred the perfect insect in the autumn from the early larvæ. I have found the imago of *N. dictæoides* in good condition as late as the 7th of September. I have never, however, taken an imago of *N. dictæa*, plentiful though the larvæ are about Rugeley. At this present time (October 3rd) I have half-grown specimens of both *N. dictæa* and *N. dictæoides*, and I got both full fed the first week in August. —RICHARD FREER; St. Mary's Hospital, Paddington, W.

NEW FOREST NOTES. — I have read with much interest Mr. E. G. Alderson's notes on his experiences at Lyndhurst during the last week of June (Entom. 258); and now forward a few observations concerning the Lepidoptera seen by me from the 13th to 26th July, in the same neighbourhood. The weather during the first half of my stay was very unsettled, but it improved greatly afterwards, and the result was, consequently, rather more encouraging than that recorded by your correspondent. *Argynnis paphia* was fairly common, the females appearing more abundantly towards the end of the month; I only saw two specimens of the var. *valesina*. *A. aglaia* occurred sparingly on the heaths, and *A. adippe* was represented by a solitary specimen. In the enclosures *Epinephela ianira*, *E. tithonus*, *E. hyperanthæ*, *Hesperia sylvanus* and *H. thaumas* (*linea*) were abundant and in fine condition. *Limenitis sybilla* was less common than usual, and the males were mostly worn. I was surprised at only taking three *Thecla quercus*, and in one enclosure—where this species was abundant in 1886—none were to be seen. Of the genus *Lycæna* the only representative was *L. ægon*, which was plentiful on the heaths, and in good condition. *Satyrus semele* was just appearing when I left the Forest, but I managed to secure a few fine males. Among the Heterocera the Noctuidæ were, with the two exceptions of *Agrotis strigula* and *Anarta myrtilli*, a blank, for I did not.

attempt "sugaring," as I was told that it was useless. The heaths proved to be the best localities for moths, *Nemeophila russula*, *Eubolia palumbaria* and *Anarta myrtilli* occurring by day, and *Gnophos obscuraria*, *Pseudoterpna pruinata*, *Acidalia straminata*, *Selidosema ericetaria* and *Agrotis strigula* at dusk. "Nothing" in the woods resulted in the capture of *Calligenia miniata*, *Acidalia bisetata*, *A. scutulata* and *Hemithea strigaria*. With regard to *C. miniata* I may add that I netted twenty specimens in about ten minutes, almost without stirring from one spot; but on going to the same place on the following evening only one put in an appearance. Besides the above I took odd specimens of *Cleora glabraria*, *C. lichenaria*, *Boarmia roboraria*, *Ellopija prosapiaria*, *Macaria liturata*, *Bupalus piniaria* (this species was still abundant, although, as might be expected, very worn), *Emmelesia alchemillata*, and *Melanthia albicillata*, while *Eubolia limitata* (*mensuraria*) was swarming along the side of the railway line near Brockenhurst. I also found a female *Pachycnemia hippocastanaria* drying its wings on a stem of bracken. Is not this a very late emergence? The only larvæ I came across were those of *Euchelia jacobææ*, which were to be seen on every other patch of ragwort. Although the Geometræ were out in some variety, this season seems to have been very bad in the New Forest, every collector whom I met agreeing as to the scarcity of insects.—W. H. JACKSON; 4, Queen Anne Villas, Grove Road, Walthamstow, Sept. 24, 1890.

COLLECTING IN DURHAM.—For the last three years I have spent the early part of August at Bishop Auckland, and on each occasion have collected Lepidoptera whenever the weather permitted. Unfortunately the weather has been in an unsettled condition each time I have gone North, consequently I have not been able to get together many species, and most of these are common ones. There are no woods of any extent in the immediate vicinity of the town, but about a mile to the east there is a small one called Belburn, containing mixed timber, including some fine beech trees, but the undergrowth in places is rank. *Cidaria immanata* and *Hypsipites sordidata* are sometimes plentiful, and many pretty forms of each have been secured. *Larentia didymata* here, as elsewhere, is abundant, and the only thing of interest concerning it is that the females are uniformly paler than those taken in other parts of the district. In 1889 *Cerostoma sequella* was fairly common in this wood, but not a specimen was to be seen this year. There is another wood to the south, distant about two miles. It was here that I last year found a larva of *Notodonta chaonia*, which produced a splendid dark imago in June. I expected to get more larvæ of this species this year, and went to work with a will, but all my efforts were in vain; not a larva of any kind could I dislodge, if there were any to be dislodged. Except some old twisted and rolled leaves, the foliage of the oaks appeared to be free from the attacks of lepidopterous larvæ. Some very nice forms of *Pædisca solandriana* were captured in this wood last year, but the species was not out when I visited the place this year. The best collecting-ground lies to the west, a few miles up the Wear Valley. Through the kindness of Mr. R. Calvert, who obtained permission of the owner, I sometimes enjoyed the privilege of collecting in some of the fine woods and plantations above Wolsingham and other places in Weardale. I could not, however, get any night-work there. Among other things taken in these excursions were some female specimens of *Argynnis aglaia* which have the basal half of the wing deeply suffused with black: these were captured 1888. I did not see the species in 1889, but it was plentiful this year,

though none of the specimens examined were anything like so dark as those secured in 1888, when dark examples of *Eubolia limitata* (= *mensuraria*) were also obtained. Of the last-named species I got some striking forms again this year; one has the ground colour of fore wings pale, with a broad, black, central fascia, and the hind wings are pale brown, with whitish central line. *Plusia interrogationis* was found at rest on the top of a stone wall, and was most acceptable, as, although "my series is quite full," I regard this particular specimen highly, as it was from it that I obtained my first idea of what the insect looked like when at rest in a state of nature. *Larentia casiata* was common in 1888, but I did not see it last year, and it was hardly well out this year. This species is also fond of sitting on rocks and stone walls, but it is only those specimens that have recently emerged from pupa that will allow one to box them from their resting-place. *L. salicata* was found with the last species, but was always scarce. *Emmelesia minorata* (= *ericetata*) fairly common last year, but I could not get one this year, and I only saw one in 1888. *L. didymata*: one specimen captured this year is the darkest I have yet seen of this species. *Cidaria immanata*: most of the specimens captured were much darker than those from Belburn or Brusselton. The sea-cliffs at Castle Eden were visited, and a few interesting species obtained, including three examples of *Lycena astrarche* var. *salmacis*; but the beautiful glen known as Castle Eden Dene, which is reputed to be a good entomological locality, had nothing better than one poor specimen of *Metrocampa margaritaria* to produce for my entertainment when I visited it on the 12th of August, 1888. Upper Teesdale is within practicable distance for an excursion, but almost too far to be done comfortably in one day,—that is, if any time is to be given to the Lepidoptera of the moors. I only went there once (8th of August last), when I took the train to Middleton, and from thence walked on the Yorkshire side of the Tees to White Force, then over the river to the Durham side, and back to Middleton, looking in at High Force on the way. The distance traversed was said to be about eighteen miles, but the way over the moors was rough. I picked up some splendid *L. casiata* from the rocks: these appear to be more strongly marked than the Weardale specimens. A small dark form of *L. didymata* abounds on these moors. I was especially pleased to meet with *Amphisa gerdingana* and *Pamplusia monticolana* (= *mercuriana*) for the first time. Sugar does not seem to be seductive in the month of August at Bishop Auckland. This year not one moth visited the bait whilst I was there, and I understand that this attraction has failed to allure Noctuae in any numbers throughout the summer, at least since May. The ragwort flowers yielded several common species, such as *Noctua xanthographa* (some very dark forms) and *Triphæna pronuba*, also a few *N. umbrosa*. Plenty of *Polia chi*, with a good proportion of var. *olivacea*, are usually to be met with on the walls, but the species was not out this year in time for me,—neither was *Larentia olivata*, which I have found in the wood above the cemetery.—RICHARD SOUTH.

NOTES FROM RINGWOOD.—Having noticed that it is many years since any record of Lepidoptera taken in this neighbourhood has been published in 'The Entomologist,' I thought an account of a few of my captures might possibly be useful to collectors contemplating a visit to Ringwood. Insects have been fairly plentiful this year, and a few species abundant, especially *Gonopteryx rhamni*, *Vanessa io*, *V. urticae*, *Pararge egeria*, *Epinephele hyperanthæ*, *E. tithonus*, and others. It was a pleasant sight to see

such numbers of *G. rhamni* and *V. io*; both literally swarmed in the Forest. I netted three specimens of the latter with the yellow markings replaced with white, and saw more. *E. hyperanthes* varied considerably from the var. *arete*, to very fully-developed eye-spot specimens, two exceptionally so; the large fritillaries rather scarce, although *Argynnis euphrosyne* and *A. selene* were common. On one day in August I took *A. paphia* and var. *valesina*, *A. adippe*, *A. aglaia*, *A. euphrosyne* (worn), and *A. selene*. *Limenitis sibylla* scarce: this species I bred from larvæ beaten in June, and have seen the imago deposit ova on two or three occasions, and by searching honeysuckle leaves have taken the ova freely: these are nearly always to be found upon the upper edge of the leaf; sometimes, though rarely, on the leaf-stalk. *P. egeria*, bred from ova, and now in pupa; *Pararge megæra* and *Satyrus semele*, common; *Polyommatus phlœas*, *Thecla quercus*, and *Lycana icarus*, all scarce; *L. argiolus*, not a dozen seen; *L. ægon*, local and few; *Pamphilus sylvanus*, *P. thaumas*, *Nisoniades tages*, and *Hesperia malva*, common; *P. thaumas*, very dark and in strong contrast to *H. lineola*; *Vanessa cardui* and *V. atalanta*, scarce and very late; *Euchloë cardamines*, *Pieris napi*, *P. rapæ*, *P. brassicæ*, and *Epinephele ianira*, well represented, but of *Thecla rubi* one specimen only. I cannot help remarking the duration of certain species, thus—*P. egeria* occurred from April to October, with a very short interval; *A. euphrosyne* well into the *A. selene* brood; *A. paphia* and *A. aglaia* to the 6th of September; *P. thaumas* was a very long time upon the wing. *A. aglaia* I found the most plentiful of the large fritillaries, females of which vary considerably, three distinct shades,—viz., 1, very dark all over; 2, colour of male; 3, light straw and bright. I have taken similar forms at Dover, whilst my Dorset specimens are all typical. The last walk I took for Rhopalocera this season was to Bolderwood, on the 16th of October, when I observed the following:—*G. rhamni*, *V. io* (2), *V. atalanta*, *V. urticae*, *P. rapæ*, and *Pararge egeria* (all fairly late). Of course it is well known that Ringwood is noted for *Emydia cribrum*, but this is not the only good species met with here; still by the number of entomologists who come solely for it, one would think otherwise; and what a lot of disappointment there is in netting this species, because so many do not know the correct time and locality to search: the whole of June and first week in July it is upon the wing,—first fortnight in June for really fine specimens: doubtless a few may be caught after the above date, still I do not believe in a distinct double brood. I went in August and searched upon the heaths, but in vain; whilst in the above-stated time I found it plentifully. In one week Mr. Gerrard and myself took about eighty each, and upon what we considered fresh ground, until our old friend Mr. Corbin informed me he used to get it there when he was a boy. I have discovered it in several places much nearer Ringwood than the old St. Leonard's locality. It is local over a great stretch of heath west of the River Avon. I am not aware of *E. cribrum* occurring in the New Forest at all, or why should the local collectors of that district come here for it? I note that the species is not confined to certain spots, but is generally distributed over a particular area. Beating for it by day is very slow work compared with netting at night. As the sun descends specimens can be observed crawling upon the heath-tops, and from about half an hour after sunset until midnight they fly in great numbers. Of the specimens netted about 60 per cent. are males; the females are best obtained by searching.—J. H. FOWLER; Poulner, Ringwood, Oct. 22, 1890.

CHELONIA VILICA: 177 PARASITES FROM ONE LARVA.—On the 8th June, 1889, I found at Torcross, South Devon, a larva of *C. vilica*, surrounded by 177 *Apanteles* cocoons. I carefully removed them from the stone on which they were clustered into a glass-bottomed box, and on the 22nd June I bred 48 *Apanteles ruficoxis*, Marshall, n. sp., MS.; on the 30th June, 1 female *Hemiteles fulvipes*; 3rd July, *Pezomachus tristis*, males and females; and on the same day, 64 males of *Hemiteles fulvipes*. A goodly mixture from one poor caterpillar.—G. C. BIGNELL; Stonehouse, Plymouth, November 6, 1890.

LARVÆ IN 1890.—With reference to the query respecting the occurrence of larvæ (Entom. 322), I am able to record only one species common in the larval state, that being *Arctia caia*, which was extremely plentiful this year round London.—J. M. ADYE; Christchurch, October 20, 1890.

LARVA OF ACRONYCTA ALNI AT CLIFTON.—I have to record the occurrence of a larva of *A. alni* here on the 18th of August last. I found it, curiously enough, crawling on the ground within a few feet of a gas-lamp, on which, three years previously, I took a specimen of the perfect insect at light.—R. M. PRIDEAUX; 9, Vyvyan Terrace, Clifton.

ARCTIA VILICA BRED IN OCTOBER.—Early in June last some eggs of *Arctia vilica* were obtained. These hatched, and some sixty larvæ were fed on groundsel (*Senecio vulgaris*). About the middle of September ten of these larvæ spun up (the rest are hybernating as usual). In October ten perfect imagines appeared. Is not this most unusual? An acknowledged authority assures me it is unprecedented, as far as his observation has gone.—ALLAN NESBITT; Seaton, Devon, November 6, 1890.

DILOBA CÆRULEOCEPHALA ON PRUNUS LAUROCERASUS.—Adverting to the discussion (Entom. 327 and 345) respecting the larva of *Diloba cæruleocephala* having been found feeding on laurel, it appears to me that it is not sufficiently recognized that the shrub usually called the laurel is the laurel cherry, *Cerasus laurocerasus*, and not a *Laurus*. No one would be surprised if the larva in question was found feeding on the common cherries, derived from *Cerasus caproniana* and *C. avium*, or any of the species of the closely-allied genus *Prunus*. The sloe, *Prunus spinosa*, is, indeed, one of the most common food-plants of the caterpillar. The fact of the larva feeding on an evergreen cherry as well as a deciduous one, is a parallel case to that of *Gonopteryx rhamni*, which fed in my garden on the evergreen *Rhamnus alaternus*, although the shrub presents much the same difference to the eye from our two native species of *Rhamnus* as the laurel cherry presents from our two common species of cherry. The interest, in each case, arises from the fact that the parent lepidopteron, when depositing her eggs, recognized the generic affinity of plants widely different in appearance.—J. JENNER WEIR; Chirbury, Beckenham, Kent.

SUGAR A FAILURE AT CHRISTCHURCH.—It may be of interest to note that sugaring here has again proved unsuccessful, though when I first commenced at the end of June, and from that date till July 10th, there seemed some hopes of a better season. During the time adverted to I took the following:—*Thyatira batis* (3), *T. derasa* (1), *Acronycta megacephala* (1), *Leucania conigera* (2), *L. lithargyria* (2), *L. pallens* (several), *Dipterygia scabriuscula* (6), *Mamestra sordida* (2), *Apamea basilinea* (1), *A. gemina* (4),

Miana strigilis (common), *M. arcuosa* (2), *Grammesia trigrammica* (1), *Rusina tenebrosa* (3), *Noctua plecta* (1), *N. triangulum* (1), *N. festiva* (several), *Mania typica* (3), *Aplecta nebulosa* (1), *Hadena dentina* (1), *H. dissimilis* (1), *H. oleracea* (1); and a few of the usual pests, fairly common. After this I went into Somersetshire for some days, and on my return (July 20th) found sugaring perfectly useless, not meeting with even a single specimen. This dearth of insects continued, whilst trying at intervals, up till about September 21st, when, after a long spell of dry weather, there came a very wet day, rain falling in torrents the whole day, especially in the evening. I then ventured out upon my favourite experiment, and so had the pleasure of seeing insects congregated in some numbers on the trees, which was gratifying to view, though, under the circumstances of the weather, far from comfortable. The following were my captures:—*Epunda lutulenta* (1), *Anchocelis lunosa* (vars., 4), *A. litura* (1), *Xanthia cerago* (1), *Calocampa vetusta* (fine, 2), *Noctua c-nigrum* (4), *Cidaria immanata* (several), *Phlogophora meticulosa* (fairly common); and a few of the usual pests, only represented by two or three odd specimens. A day or two after this I took two more fine *E. lutulenta*, and a few each of *A. lunosa* and *N. c-nigrum*; but, as the weather became drier, moths got scarcer, as before. I think this experience coincides with that of Mr. A. E. Hall and Mr. R. Adkin (*Entom.* 321, 322).—J. M. ADYE; Christchurch, October 20, 1890.

THE VIOLET TINGE IN *HELIOPHOBUS HISPIDUS*.—It may be interesting to note that the violet tinge was almost entirely absent from specimens of *Heliophobus hispidus* taken by me this year at Portland. From this I should suppose that the species varied in this respect in different years, which may account for the fact that I did not notice any tinge until 1889 (*Entom.* 60).—NELSON M. RICHARDSON; Montevideo, near Weymouth, November 13, 1890.

SIREX GIGAS.—Yarmouth.—A specimen of this insect was brought to me, alive, in July. It was taken off a gentleman's back in the market. A friend of mine has one, which he captured in the town about two years ago.—J. E. KNIGHTS; North Denes, Great Yarmouth.

Tenby.—A specimen of *Sirex gigas* was brought to me when at Tenby last August.—T. B. JEFFERYS; Clevedon.

DISPARITY OF SIZE IN SIRICIDÆ.—Several specimens of *Sirex gigas* were taken here and in the neighbourhood during the autumn. The great discrepancy in size in different insects of both sexes in the Siricidæ is very striking. A female of *Sirex juvencus* sent me by Mr. J. E. Robson, captured at Hartlepool on 30th September last, measures only $1\frac{1}{4}$ inch from tip to tip of wings; the length of the body, including head and ovipositor, being $\frac{3}{4}$ of an inch; whilst a female of *S. juvencus*, taken here, measures in wing expanse 2 inches; the length of body, with head and ovipositor, is $1\frac{1}{2}$ inch. The disparity in *S. gigas* is equally remarkable.—JOSEPH ANDERSON, jun.; Chichester.

INFORMATION WANTED.—If any of your readers can supply me with any facts they may have observed or know as to the life-history of the Siricidæ, especially of *Sirex gigas*, I should be much obliged. I want them to incorporate with a paper in preparation. Please write direct to Dr. LIVETT, Wells, Somerset.

NOTES FROM LANCASHIRE AND MERIONETHSHIRE.—Spending a few days at Grange-over-Sands last Whit-week, I took three specimens of *Nemeobius lucina*, and a friend secured a fourth. I also took a good series of *Leucophasia sinapis*, as well as several *Lycæna argiolus*, *Anarta myrtilli*, and *Saturnia pavonia (carpini)* in the neighbourhood; the two last, of course, on the mosses. I spent a few days at Towyn, in Merionethshire, early in July, and found at Dolgoch, a beautiful gorge in the neighbourhood, *Epinephele hyperanthes* in abundance.—W. HOWARD GOULTY; Romily, Cheshire, November 7, 1890.

CAPTURES FROM GAS-LAMPS.—September 5th, 1890. I took *Phibalapteryx vittata (lignata)*, *Coremia designata (propugnata)*, *Cidaria testata*, *C. immanata*, *Melanippe fluctuata*, *Halia vavaria (wavaria)*, *Eugonia alniaria (tiliaria)*, *Paraponyx stratiotalis* (abundant), *Noctua glareaosa* (hitherto unrecorded for Chester), *Luperina testacea*, *L. cespitis*, *Neuronia popularis*, *Anchocelis lunosa*, *Cosmia trapezina*, *Noctua xanthographa*, *Hydræcia micacea*, *Porthesia similis (auriflua)*, and one *Hepialus humuli*. This is the first specimen of *H. humuli* I ever took at or from a gas-lamp. It is a small female, apparently fresh from the chrysalis, and is a couple of months out of date.—J. ARKLE; Chester.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—Nov. 5th, 1890. The Rt. Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. Mr. Francis H. Barclay, of Knott's Green, Leyton, Essex; Miss M. Kimber, of Cope Hall, Enborne, Berkshire; and Mr. John E. Robson, of Hartlepool, were elected Fellows; and Major-General Carden, Mr. J. E. Eastwood, and Mr. A. E. Hall were admitted into the Society. Lord Walsingham announced the death of Mr. Atkinson, of the Indian Museum, Calcutta. Mr. A. H. Jones exhibited a number of Lepidoptera collected in June last near Digne, Basses Alpes, including *Papilio alexanor*; *Parnassius apollo*, larger and paler than the Swiss form; *Anthocharis tagis* var. *bellezina*; *Leucophasia duponcheli*; *Thecla spini*; *Thecla ilicis* var. *cerri*; *Lycæna argiades* var. *corretas*; *L. argus* var. *argyronomon*; *L. bellargus* var. *ceronus*; *Melitæa deione*; and *Argynnis euphrosyne*. Mr. W. E. Nicholson also exhibited a collection of Lepidoptera, formed near Digne, last June, which included very large specimens of *Papilio machaon*; *P. podalirius*; *Thais rumina* var. *medesicaste*, larger and redder than the Mediterranean specimens; *Apatura ilia* var. *clytie*; *Argynnis adippe* var. *cleodoxa*; *A. daphne*; *Melanargia galatea* var. *leucomelas*; *Vanessa egea*, bred from pellitory; *Satyrus semele*; and many others. Mr. C. O. Waterhouse exhibited the upper and lower membranes of a wing of a species of *Attacus*, which had been separated without removing the scales, and mounted on glass so as to show the internal surfaces. He explained that he separated the membranes first by inserting a needle in the vein at the base of the wing, and, when they were sufficiently parted to be taken hold of, they were gradually drawn asunder, and floated on water until the two membranes were entirely separated. He said that some years ago Dr. Hagen had shown that this could be done with fresh examples of *Libellulidæ*. Dr. D. Sharp exhibited a photograph he had received from Prof. Exner,

of Vienna, showing the picture obtained at the back of the eye of *Lampyris splendidula*. He stated that this picture is continuous and not reversed, and shows the outlines of lights and shades of objects at a distance as well as of those closer to the eye. Mr. H. Goss exhibited a specimen of *Zygana filipendula* var. *chrysanthemi*, which he had taken at Rhinefield, in the New Forest, on the 15th July last. Dr. P. B. Mason said this variety was known on the Continent of Europe, and was figured by Hübner in his 'Sammlung,' a copy of which work he exhibited. He added that he possessed a similar specimen of this variety taken by Mr. Nowers in Wyre Forest, Worcestershire. Colonel Swinhoe stated that he possessed a similar variety of a species of *Syntomis*. The Rev. Dr. Walker exhibited a number of Diptera, Hymenoptera, and Coleoptera recently collected in Iceland; also some drawings illustrating the various forms of *Crymodes arulis* occurring in Iceland which he had shown at the October meeting of the Society; he also exhibited seven varieties of *Melanippe thuleana*, nine of *Coremia munitata*, and a few of *Noctua conflua*, illustrating the varied forms of these species occurring in Iceland. Dr. Mason said that the only British specimens of *N. conflua* which he had seen resembling the Iceland form of the species were taken at Wolsingham, Durham. Mons. A. Wailly exhibited and remarked on a number of Lepidoptera from Japan. The collection comprised about forty-one species, eleven of which, it was stated, were not represented in the British Museum collections. Mr. A. C. Horner exhibited a number of rare species of Coleoptera, including *Homalota crassicornis*, Gyll., *H. fimorum*, Bris., *H. humeralis*, Kr., and *Euryporus picipes*, Pk., collected at Church Stretton, Shropshire; and also *Amara nitida*, Sturm., *Oxyptoda amana*, Fair., *Homalota testaceipes*, Heer, *Lithocharis apicalis*, Kr., and *Epuræa neglecta*, Heer, from the neighbourhood of Tounbridge. Mr. Meyer-Darcis exhibited a specimen of *Termitobia physogastra*, Ganglb., a new genus and species of Brachelytra obtained in a white-ants' nest from the Congo. Dr. Sharp commented on the interesting nature of this exhibition. Colonel Swinhoe exhibited a collection of moths from Southern India, which comprised about forty-one species, distributed amongst the following families:—Syntomidæ, Lithosiidæ, Arctiidæ, Lasio-campidæ, Zerenidæ, Fidoniidæ, Leucanidæ, Heliothidæ, Acontiidæ, Poa-philidæ, &c. He also read a paper describing these species, entitled "New Species of Moths from Southern India." The Rev. T. A. Marshall communicated a paper entitled "A Monograph of British Braconidæ. Part IV." Lord Walsingham read a paper entitled "African Micro-Lepidoptera," containing descriptions of seventy-one new species, and of the following nine new genera, viz.:—*Autochthonus* (type *A. chalybiellus*, Wlsm.), *Scalidoma* (type *Tinea horridella*, Wkr.), *Barbaroscardia* (type *B. fasciata*, Wlsm.), *Odites* (type *O. natalensis*, Wlsm.), *Idiopteryx* (type *Cryptolechia obliquella*, Wlsm.), *Microthauma* (type *M. metallifera*, Wlsm.), *Licmocera* (type *L. lyoniella*, Wlsm.), *Oxymachæris* (type *O. niveocervina*, Wlsm.), and *Micropostega* (type *M. æneofasciata*, Wlsm.). Several European and American genera were recorded as new to the African fauna, and the occurrence of one Australian and two Indian genera was also noted.—H. Goss, Hon. Sec.

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.
—October 23rd. W. H. Tugwell, Vice-President, in the chair. Messrs. P. J. Crane, of Chingford, and G. Wallace, of Forest Hill, were elected members. Mr. Bouttell exhibited two series of *Eugonia quercinaria*,

Hufn., one bred from larvæ fed on elm, and the other on willow. He stated that those fed on elm were, by accident, kept without food for some time after the first moult, and in consequence most of the brood perished. Nineteen reached the perfect stage, of which only two were females. Mr. E. Joy, bred examples and pupæ of *Plusia festuca*, L. Mr. Tugwell, a box of Lepidoptera, collected by Mr. Lachlan Gibb in Canada. Mr. R. Adkin, specimens of *Tortrix piceana*, L., from Surrey and Hampshire, and expressed an opinion that the species was more widely distributed than was generally supposed. Mr. South remarked that the species had been known in England for many years. Mr. Fenn thought it had been overlooked owing to the difficulty in obtaining the larvæ, which fed on the tops of the trees. Mr. C. G. Barrett said the species was an abundant one on the Continent. Mr. Hawes, examples of *Argynnis euphrosyne*, L., showing considerable variation in the black markings. Mr. P. Bright, two varieties of *Arctia caia*, L., one very dark and the other an extremely pale form; also a series of *Triphana orbona*, Hufn. (*subsequea*, Hb.), from Forres. Mr. Bright stated he had written for further particulars of the specimen of *Vanessa* exhibited by him on the 25th ultimo, and which was stated to have been taken at Polegate; he understood that Mr. Weir, referring to this specimen, had expressed an opinion that it was an example of *Vanessa milberti*. Mr. Cockerell exhibited a cocoon of *Zygana filipendulæ*, L., from near Leigh, Essex, not uniformly yellow, remarking that sometimes the cocoons of this species were half yellow and half white or whitish. He also showed *Myzium sexincta*, Fabr., from Long Island, and said that this species was found by Dr. Riley in the stomachs of sparrows (*Passer domesticus*) in thirty instances, thus showing that its wasp-like attributes did not protect it from that bird; also a Tipulid fly allied to *Tipula*, but apparently belonging to a new or little-known genus from Swift Creek, Custer Co., Colorado, where it mimics a species of Ichneumonidæ found in the same locality.

November 13th.—W. H. Tugwell in the chair. Messrs. G. Champion, of St. John's Wood; A. J. Hodges, of Highbury; and A. H. Hill, of Hampstead, were elected members. Mr. Wellman exhibited *Bryophila impar*, Warren, from Cambridge, and a specimen of *B. muralis*, Forst., from Folkestone, very similar to the examples of *impar*. Mr. Tugwell, long series of *Cerastis vaccinii*, L., and of *C. spadicea*, Hb. A discussion ensued as to this exhibit, in the course of which Mr. South said that *spadicea*, Hb., was a form of *vaccinii*, and that the form shown by Mr. Tugwell as *spadicea* was known on the Continent as *subspadicea*, which was said to be a form of *C. ligula*, Esp. Mr. C. G. Barrett remarked he had never had any difficulty in separating the two species. Mr. R. Adkin, examples of *Spilosoma mendica*, Clerck, bred from ova obtained by the pairing of a female of the Irish form of the species with a male of the English form. From the ova obtained only two moths were bred, both of which were males, and neither were like the English or Irish form. Mr. Tugwell remarked that Mr. Adkin having bred the species from the two forms, there could be no longer any doubt as to the two forms being one and the same species; the two examples shown were very similar to the Yorkshire specimens bred by Mr. Harrison. Mr. Adkin also exhibited *Peronea sponsana*, Fb., from the New Forest, and referred to his exhibit of this species in 1889, when nearly all those then shown were the variety. This year he had endeavoured to obtain the species as it occurred in the New

Forest; out of some twenty specimens there were only four or five of the variety, the others gradually descending to the type, but none of them were exactly like those taken the previous year. Mr. Tugwell stated that he had obtained the form now shown, at Blackheath. Mr. Atkinson exhibited a small collection of all Orders of Insecta from Africa. Mr. T. D. A. Cockerell, insects from the Wet Mountain Valley, Colorado, to illustrate parallel variation in Diptera and Hymenoptera; series one, green to blue (metallic colours); series two, yellow to red (pubescence). Some observations were made on the abundance this year of the larvæ of *Mamestra persicaria*, L., in the neighbourhood of London.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—October 20th, 1890. Mr. W. G. Blatch, F.E.S., President, in the chair. The Rev. E. J. Nurse, 45, Francis Road, Ladywood, was elected a member of the Society. Mr. R. C. Bradley showed *Semasia waeberiana*, from his garden at Moseley. Messrs. P. W. Abbott and C. J. Wainwright showed collections of insects taken at Porlock, Somersetshire, this year. Mr. W. G. Blatch showed a fine series of *Etophorus imperialis*, from Colchester. He also submitted a complete list of the Coleoptera taken by himself at Church Stretton, during a recent visit. The list included 125 species, represented by 610 specimens. A long discussion followed on the season, in which Messrs. W. G. Blatch, G. T. Baker, and C. J. Wainwright joined. The general opinion was that it had been a very bad one for insects.

November 3rd, 1890. Mr. W. G. Blatch in the chair. Mr. P. W. Abbott showed *Gortyna ochracea* and *Nonagria arundinis*, from Sutton. These had been very greasy, but had been quite cleaned by immersion in benzine. Mr. Blatch said that he had quite removed the grease from a beetle by immersion in petrol. Mr. A. Johnson showed *Pacilocampa populi*, from Sutton, *à propos* of which Mr. Thornehill said that he had known larvæ of this species come to sugar. Mr. R. C. Bradley showed a nice series of *Hypsilophus marginellus*, bred from larvæ sent him by Mr. Eustace Banks. Mr. C. J. Wainwright showed *Zygæna meliloti*, from the New Forest; also *Zygæna filipendulæ*, from Stroud, several specimens of which showed more or less yellow.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—October 18th, 1890. Monthly meeting. S. J. Capper, F.L.S., President, in the chair. Mr. P. Schill, of Manchester, was elected a member. The President made some remarks on the proposed record of the Insect Fauna of Lancashire and Cheshire, and presented the Society with a copy of the work by the late Benjamin Cooke, one of the former Vice-Presidents. In speaking of this gentleman, the President said that any work he had done might be relied upon, as he was one of the best authorities on the neglected Orders of insects that had ever lived. A resolution was subsequently passed requesting the existing Council of the Society to form a Committee for the purpose of undertaking the work. Messrs. Harker and Jones read a paper entitled "A week at Howth," in which they gave a graphic description of a week's collecting at this locality, illustrating the paper with a large number of specimens. During the *conversazione* the President showed some fine varieties of *Arctia caia*. The Vice-President showed forms of *Vanessa antiopa* for comparison, and Mr. Sharp Coleoptera collected at Howth.—F. N. PIERCE, *Hon. Sec.*

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